Telephony.

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CONVENTION OF THE INTERSTATE INDEPENDENT TELEPHONE ASSOCIATION.

The convention of the Interstate Independent Telephone Association, to be held at the Sherman House, Chicago, on April 9, 10 and 11, promises to be the largest gathering of Independent telephone men ever held. The committee has already received over four hundred acceptances to the invitations sent out to Independents in Illinois, Iowa, Wisconsin, Michigan, Indiana, Kentucky and Missouri, and it is estimated that the total attendance at the convention will be in excess of six hundred.

A number of prominent national and state officials are expected to be present, and Mayor Harrison of Chicago has been invited to make the address of welcome.

The banquet, to be held on the evening of April 9, will be a most elaborate affair. Every well-known telephone man in the seven states mentioned has been invited, and the response has been so general as to insure a most enjoyable time.

The program of papers and addresses at the convention has been prepared and embraces features of unusual interest. The remaining plans for the entertainment of visitors and delegates have been attended to with every possible care by the entertainment committee, aided by the manufacturers and jobbers of Chicago and neighboring cities. The press of Chicago has lent its hearty assistance to the success of the association and will devote prominent space to the proceedings of the convention. The meeting is universally recognized as one of the greatest importance to the Independent movement of the central West, and will be fruitful of practical results to Independent telephony throughout the United States.

The new Interstate Independent Telephone Association has for its object the strengthening of the Independent cause in the various states included in the territory covered by the Association. It is intended to supplement the work of both the local state associations and of the National Independent Telephone Association, and to devote special attention to the Independent field of the central states.

Space in the convention headquarters has been reserved by a large number of leading manufacturers and jobbers, who are co-operating in a resolve to make the display of telephone apparatus and accessories the most complete and elaborate ever shown at a telephone convention. A number of novel exhibits have been planned and it is no exaggeration to say that the success of the convention is assured. Never before at any convention has such an extensive program of entertainment been attempted. The comfort and pleasure of every attendant will be the especial care of a host of representatives of the entertainment committee, and no expense has been spared in planning this feature of the meeting. Time will be set apart for the inspection of the exhibits and to enable attendants to visit Chicago's various factories, supply houses and other places of interest. The sessions of the convention, extending over three days, insure the carrying out of the complete program in the most satisfactory manner.

CONVENTION HEADQUARTERS, SHERMAN HOUSE, CHICAGO.

The railroads have granted a rate of a fare and a third for the round trip from all points in the seven states, and will reserve extra accommodations for telephone men.

A meeting of the Illinois Independent Telephone Association will be held at the same time and place as the Interstate convention, but the proceedings will probably be merged in the meeting of the larger association after the election of officers. The state associations of Wisconsin and Iowa, at recent conventions, voted to attend the convention in a body.

Chicago will be more than ever the center of Independent telephony during the sessions of the convention, and many valuable and practical plans will be outlined for the future progress of the movement. The convention will be pre-eminently a business meeting, and its effects will be far-reaching. The committee of entertainment and arrangements are H. B. McMeal, chairman; J. J. Nate, S. A. Dinsmore, I. A. Lumpkin and W. E. Burke.

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The May number of TELEPHONY will be a convention report number and will contain a complete account of the proceedings of the Interstate Independent Telephone Association convention. The addresses and papers will be published in full, as well as a detailed account of the three days' session.

PRESIDENTS OF SEVEN INDEPENDENT STATE TELEPHONE ASSOCIATIONS.

U. S. ALDERMAN, Iowa.
H. E. RALSTON, Missouri.
RICHARD VALENTINE, Wisconsin.
I. A. LUMPKIN, Illinois.
L. A. FRAZEE, Indiana.
J. B. WARE, Michigan.
H. V. BISHOP, Kentucky.

PROMINENT INDEPENDENT TELEPHONE MEN OF ILLINOIS

WHO WILL ATTEND THE CONVENTION OF THE INTERSTATE INDEPENDENT TELEPHONE ASSOCIATION AT THE SHERMAN HOUSE, CHICAGO, APRIL 9, 10 AND 11, 1902.

THE TECHNICAL DEVELOPMENT OF TELEPHONY.

BY KEMPSTER B. MILLER, M. E.

It is not the object of this article to trace with great historical accuracy the development of the telephone and its accessories, but for the sake of interest alone, to give a rapid review of this development, which means so much to the world at large, and to those in the telephone business in particular.

In 1876 the first successful speaking telephone was produced independently by Bell, Gray, and perhaps, others. One would be foolish at this late day to reopen the question as to who actually invented the telephone first; and it is certainly not my intention to do so. We all know that the patent office awarded the patent to Alexander Graham Bell, and I am well content to let the decision stand.

For the inception of the telephone, we must go back to 1854, when Charles Bourseul, a Frenchman, predicted the transmission of speech, and but for a slight error his method is that followed to-day. His words were: "Suppose a man speaks near a movable disc, sufficiently flexible to lose none of the vibrations of the voice, and that this disc alternately *makes* and *breaks* the current from a battery; you may have at a distance another disc which will simultaneously execute the same vibrations." Had he substituted the words "vary the strength of" instead of "make and break," the telephone would probably have been produced over twenty years sooner that it actually was.

In about 1861, Philip Reis, a German, constructed a telephone following very closely the path outlined by Bourseul. It has been stated by high authority that Reis' telephone actually did transmit speech, and this is not very hard to believe; but as I have said, however, it is too late to reopen the discussion.

Bell's transmitter and receiver were practically alike. A coil of wire was wrapped around a permanent magnet at each end of the line, and in front of each permanent magnet a flexible diaphragm of iron was mounted. The vibration of the diaphragm at the transmitting end caused by the voice, magnetically induced currents in the coil at that end, which currents passed over the circuit of the line, and through the coil at the receiving end, thus causing the core of the receiving instrument to vary its magnetic pull upon the diaphragm, and causing the latter to execute substantially the same vibrations as those at the transmitting end.

Bell's receiver is that of to-day, as far as theory goes, but the transmitter has been entirely modified in order to meet the more exacting requirements of present practice. Transmitters were soon produced by Bell, Gray, and many others, which, instead of generating the current themselves, simply served to vary the strength of the current produced by another source. It will be remembered that Bourseul suggested that the transmitter be caused to make and break the circuit, and this was where Reis and many unhappy inventors, even down to our present day, have gone astray. It was soon found that the transmitter, in order to produce the desired variations in current strength, must vary the resistance of the battery circuit between finite limits, and that it was impossible to produce speech if the transmitter were allowed to make and break the circuit.

Transmitters working on this principle assumed many forms. It was found that the most advantageous way of varying the current was by causing the vibrating diaphragm to vary the pressure between two electrodes, and that these electrodes must be in constant contact. Edison soon demonstrated that carbon was by far the most suitable material for the electrodes, and Prof. Hughes was responsible for the idea now universally adopted that a loose contact between the electrodes was far better than a heavy contact.

Still another step was taken in these early days, by Henry Hunnings, who invented a transmitter wherein a large number of loose contacts were put into the circuit by the use of granulated carbon, interposed between the two electrodes.

We will now consider for a moment the early development of the telephone exchange, and particularly the telephone switchboard. By an exchange is meant a system wherein any given subscriber in a community can be put into communication with any other subscriber. As in the case of the broad idea of transmitting speech, so the broad idea of exchange service had its origin in the art of telegraphy.

The first idea of exchange work that I am able to find suggested, is in a British patent to Dumont, in February, 1851. This imperfectly describes a system of telegraph lines radiating from a central station, which means at the central station for placing any line in telegraphic connection with any other. Like the idea of Bourseul, this of Dumont was long ahead of its time—occurrences found in the early development of almost every industry.

In 1874, before the birth of the telephone, a telegraph exchange system was put into use in New York City. It was for connecting lawyers who chose to subscribe, and was for this reason called the law system. The telegraph instruments, which were of the dial pattern, were subsequently replaced by telephone instruments, and thus originated, as far as I am able to find out, the first telephone exchange system. It was from this particular system that the well-known law telephone system, widely used in later years, took its name.

All of the early telephone switchboards were built upon a plan which had proven successful in telegraphy; the lines usually terminating in vertical conducting strips across which were placed horizontal conducting strips for connectors. Any two lines could be connected together by connecting each by means of a plug to the same horizontal strip. Indicators in the form of electro-magnetic drops, or annunciators were used in connection with each line, and also spring switches, or spring jacks by means of which the operator could connect her telephone in the circuit with any line.

It very soon became apparent that a far greater number of lines would have to be handled in the telephone business than in telegraphy, and for this reason the old telegraph switchboard soon became entirely inadequate. In order to meet the new demands, the development began in another direction. Each line terminated in a spring jack, and an indicator, and a connection was made between any two lines by means of flexible conducting cords terminating in plugs adapted to fit into and make connection with the spring jacks. Thus we find about the beginning of the 80's, the prototype of our modern switchboard.

Let us now summarize the condition of affairs up to about the year 1880: The receiver was in fairly good form. The transmitter had all the elements of to-day, and had only to be perfected mechanically to make it what we now know. Each subscriber's telephone was provided with a local battery and an induction coil, forming, together with the receiver and the transmitter, the talking apparatus. A magneto generator was used for calling central, and a magneto call-bell was used for receiving calls from central office. A hook for supporting the receiver, usually automatic in its action, was used for switching the talking apparatus and the signaling apparatus alternating into and out of the circuit.

The switchboard was capable of handling a few hundred subscribers, and as the number of subscribers was limited, and the use of the telephone very slight, they met the conditions fairly well. An indicator of the electro-magnetic type was used for each line to respond to the current of the subscriber's generator, and a spring jack was also provided by means of which and a flexible cord, the operator could connect her telephone with the subscriber calling, call the subscriber wanted, and then complete the connection between the two subscribers.

Grounded lines were used in those days almost uni-

versally, as there were no electric railways, or electric lights to vary the ground potential. The transmission afforded by the instruments then available was so weak as to produce comparatively little trouble in the lines of cross talk. The time was not ripe for metallic circuits.

The next ten years, up to 1890, show a steady development of the industry, marked by two radical improvements. First, the adoption of metallic circuits instead of grounded lines, and second, the introduction and development of the multiple switchboard. During this time the electric railway, and more particularly the electric light, using their high tension currents, began to be widely used, and the life of the telephone manager was made almost unendurable. It was found that the telephone receiver was an entirely different instrument from the telegraph sounder, or relay, in that the former would respond to currents so feeble as to be detected only by a galvanometer, and perhaps not then, while the latter could be readily adjusted to respond only to the current intended for it. The telephone people struggled hard but without avail. They were forced not only to insulate their circuits from the ground, and thereby resort to a return wire, but also to make these circuits so nearly balanced inductively that they would not pick up by induction all sorts of noises caused perhaps by an alternating current lighting plant in the next county.

The other improvement of this decade, the introduction of the multiple switchboard, was made necessary by the demand for increased facilities for handling connections between subscribers. The problem at first, as I have said, was a very simple one, but a little consideration will show that as the number of subscribers increased, it became very complex. It soon became impossible, under the old arrangement, to place all of the indicators and jacks for the exchange within the reach of a single operator. One remedy for this was to provide specially long cords and let the operator make a connection at one end of the board, and then walk down to the other with the other end of the cord to complete the connection. An exchange was actually constructed with a pit built at one end of the board reaching down through several floors in order to take up the slack of the cords.

Another expedient was tried, and is still used to some extent. That is the introduction of transfer lines, or transfer circuits, between different sections of the board, by which a connection called for between lines terminating on different portions of the board could be completed through the circuit of one of the transfer lines, extending between the corresponding portion of the board. These systems have been termed transfer systems, and on account of their great simplicity and cheapness are still used to a considerable extent.

These schemes, however, and many others, were in the nature of makeshifts, and did not sufficiently meet the demands to be made by future service.

The multiple switchboard was, I believe, the conception of LeRoy B. Firman, and was described in a patent issued to him in January, 1882. The idea is simple, but as carried into practice at present it becomes wonderfully complicated, appearing especially so to those not familiar with its mysteries.

The whole idea of a multiple board is to put within the reach of every operator a spring jack for every line coming into the exchange. In view of the fact that, due to mechanical limitations, only a certain number of jacks can be placed in a given area, it became necessary to duplicate the jacks for all lines entering the exchange on every section of the board, so that no matter at what portion of the board an operator was located, she had within her reach a jack for every line. Only one indicator was provided for each line as before, and these were distributed in front of the operators according to the number of calls that each operator could handle. Thus, when a call was received on any line, it was registered at a certain section of the board by the indicator belonging to that line, and the operator at that section in response to the call, was enabled to make connection with that line, and connect it by means of flexible cords to any other line without moving her position.

It is impossible in the scope of this article, to describe in detail the workings of the multiple board. I will, therefore, pass on to the end of this decade, that is, to about the year 1890, and see what the condition of affairs was then.

The transmitter, receiver, and in fact the entire subscriber's instrument remained practically unchanged so far as the functions of its various parts are concerned, but many, and important improvements were made in the design. While the multiple board had come into use in a number of large exchanges in this country and in Europe, magneto signaling was still adhered to. The subscribers had not yet begun to find fault because they were compelled to turn a crank every time they wished a connection. The local battery was still required at each subscriber's telephone, but there had been some suggestions as to better things ahead.

It is within the last decade, more particularly within the last eight years, that the greatest advances in telephone engineering have taken place. I do not mean by this that the advances made up to the year 1892 were not important, and were not necessary, or just as hard to make as those that have been made since. It is necessary to learn to creep before we can walk, and in the telephone business there was no exception. The public at large did not, until about this time, begin to wake up to the possibilities of the telephone. It was looked on as a luxury, and not as a necessity. When it did wake up, the engineers were confronted with a problem to tax their utmost energies. The demands of the public were not only for better service, but for more of it. Thousands required telephone service where tens had required it but a short time before. The switchboards which had been built on the old magneto principles, even though of the multiple type, proved totally inadequate to handle the service; not only in that they were not built to handle connections rapidly enough, but they were not capable of supplying service to a large enough number of lines.

The most radical change made in the last decade has been the removal of all sources of energy from the subscriber's station to the central office, the result being what it known as the common battery or central energy system. In the central energy system all batteries at the subscribers' stations are dispensed with, as are also the magneto generators. As a result, the subscribers' instruments have been cheapened, rendered more compact and sightly and less liable to get out of order, easier to maintain, and, on the whole, a far more desirable piece of apparatus from every point of view. But the simplification of the subscribers' apparatus was not the only thing accomplished by this change. The so-called automatic calling was made possible, so that the subscriber no longer was accorded the pleasure of turning a generator crank in the vain hope that he was ringing a bell and annoying the operator. In the new systems all the subscriber has to do is to raise the receiver from the hook and put it to his ear, the hook switch serving automatically to close the circuit of a subscriber's line, and thus allow current from the central office battery to operate the signal to attract the attention of the operator.

Another very desirable feature was incidentally made possible. In the old systems a disconnecting signal was given only when one or both of the subscribers were thoughtful enough to ring off, and as a result the operator was always in doubt as to whether she was at liberty to pull down a connection or not. In order to make certain of the true state of a connection she was forced to constantly listen in on the circuit, thereby not only annoying the subscribers, but greatly impairing her own efficiency for other work. In modern common battery systems, just as the signal is automatically sent by a subscriber in taking his receiver off the hook, so another signal, which is placed

under the control of the line as soon as a connection is made, is automatically sent when the subscriber hangs up his receiver, thus showing the operator definitely whether the subscriber is using the line or not. This is called the "supervisory system," and this alone has been responsible for an increase of 25 per cent in the actual operative efficiency of an exchange. By this I mean that by virtue of the supervisory system, operators are enabled to handle about 25 per cent more subscribers than without this system.

With the common battery system came the necessity for power plants at the central office. The current for talking, as well as for operating all of the signals, except the subscribers' bells, is furnished by storage batteries arranged to give approximately 24 volts. Machines have to be furnished for charging these batteries and others for furnishing alternating current for ringing the subscribers. Absolute protection must be had against break-downs, and for this reason, wherever possible, two or more independent sources of power are made use of for driving the machines. The machines and all other parts liable to break down must, for the same reason, be provided in duplicate. One of the nicest problems in telephone engineering at present is that of the economic design of the power plant.

Another outgrowth of the common battery system was the almost universal substitution of miniature incandescent lamps for mechanical signals. The greatest advantage of the lamp is that it affords the best signal in the least amount of space. These little lamps, not quite as large as the end of an ordinary lead pencil, can be mounted in the same space as the jacks. They are much less liable to get out of order than the ordinary mechanical signal, they are easily replaced when necessary, and, moreover, all things considered, they are the cheapest signal known. The lamps themselves are operated in the line circuit, and herein lies another distinct advantage of the lamp. The relay, which is the part most liable to get out of order, may be, and usually is, entirely removed from the switchboard and mounted on a separate rack, where it is easily accessible.

The tendency of modern engineering is now toward larger exchanges, this being one of the necessary outcomes of the enormous increase in the demand for service. Ten years ago an exchange for accommodating 6,000 subscribers was considered enormous, and it was not thought practicable to ever increase beyond that limit. The reason for this limit is readily seen. In years past it was not possible to mount the style of jacks then used on less than ½-inch centers, both vertical and horizontal, and, inasmuch as 6,000 jacks were about all that could be placed within the reach of a single operator, this logically limited the possible size of the exchange. The ingenuity of the telephone inventors, however, have, within the last few years, greatly reduced the complexity of the circuits, so that in some cases only two contact points are required in the jacks, thus making it possible to very easily reduce them to ⅜-inch centers, and even to ¼-inch centers. The reduction of the jacks to this latter dimension would mean that 24,000 lines could easily be accommodated in a single multiple board.

I might mention still another means which has been proposed and successfully put into operation, by which the ultimate capacity of any multiple exchange, with a given size jack, can be increased fourfold. If this were done it would be possible to construct a multiple board having a capacity of 96,000 subscribers. This is far in excess of anything that has been up to to-day needed, or that it is probable will be needed in the immediate future; but this figure represents the maximum size of the multiple board that is to-day within the conception of the telephone engineer.

The Twin City Telephone Company of Minneapolis and St. Paul, Minn., Mr. C. H. Judson, general superintendent, opened its new Minneapolis main exchange on March 22. The opening was made the occasion of an informal reception by the officers and directors.

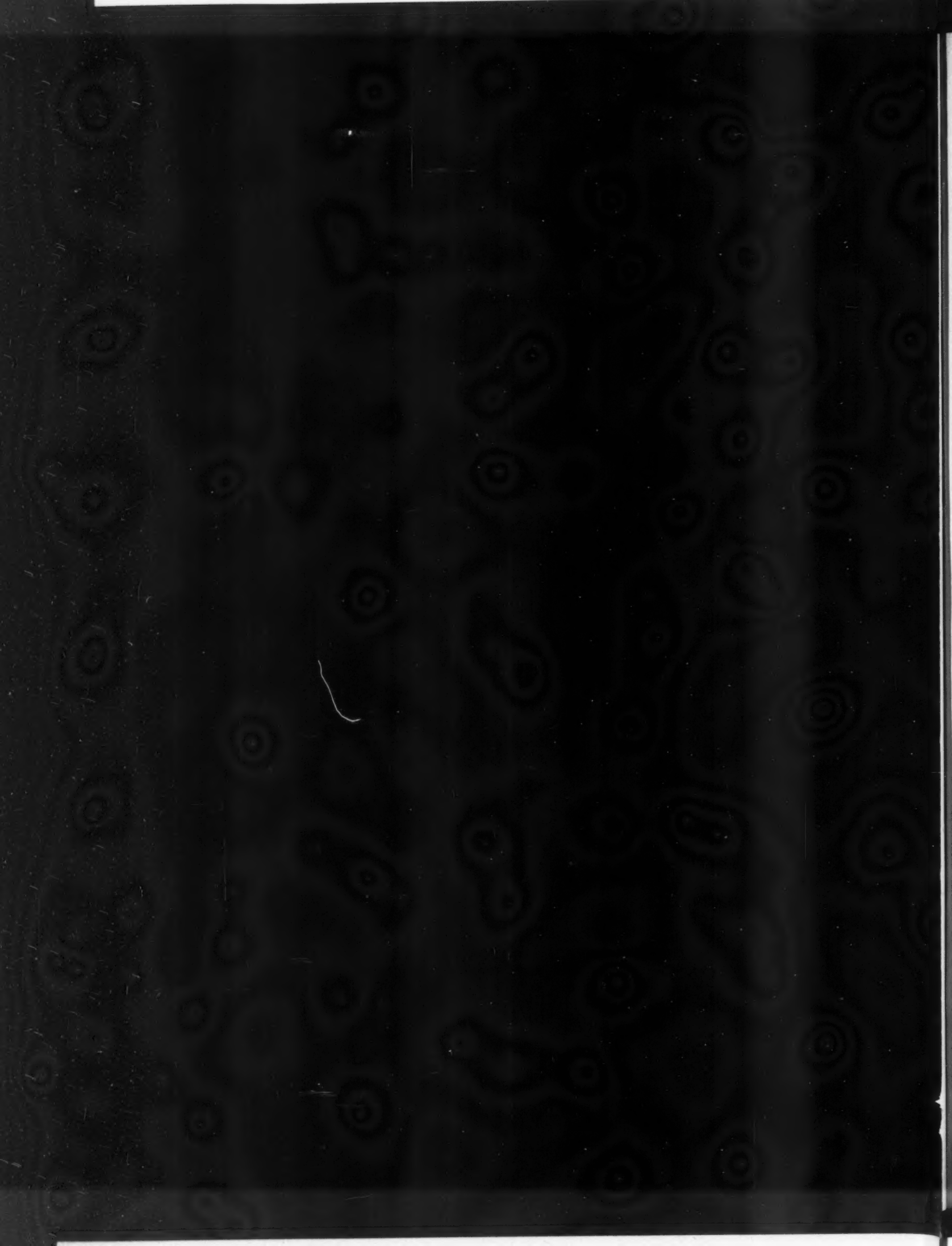
DECISIONS AFFECTING TELEPHONY.

PREPARED FOR TELEPHONY BY ANDREWS & MURDOCH, BERRIEN SPRINGS, MICH.

LINEMAN'S ASSUMPTION OF RISK.

Thomas Roberts, in the employ of the Missouri and Kansas Telephone Company, at South Park, near the city of St. Joseph, while assisting in the fastening of lead wires to cross-arms and tightening same was thrown to the ground by reason of the breaking of a rotten cross-arm, and severely injured.

In an action brought by Roberts against the company for damages, the evidence showed the following facts: Plaintiff was thirty-four years old at the time of the accident, and for eight years prior thereto had been working as a lineman for the Western Union Telegraph Company, the Missouri Electric Light Company of St. Louis, and at different times for the defendant. He was perfectly familiar with the duties of a lineman and with the risks incident to that work. He knew how to test a pole or cross-arm before going upon it to ascertain whether it was rotten or sound, safe or dangerous. He knew that the life of a cross-arm or a pin in a cross-arm was from six months to six, or even ten years; and that they are liable to dry rot, and that no one can tell how long one will last. He had worked on this same line and upon this same pole and cross-arm, and had put this same peg or pin in this same cross-arm, and strung a wire to it, during the summer immediately preceding the accident. He knew that the tests for ascertaining whether a cross-arm was sound or rotten were to strike it with a hand axe or with the pliers, or to dig into it with a screw driver, or to drive a screw into it. He admits he made no test whatever of the cross-arm. He says it was painted, and appeared to be all right, but because it was painted its condition could only be ascertained by applying one of the tests mentioned. The pole was owned by the city, and had only two cross-arms. The top one was short, and carried the electric light wires; the lower one was a ten-pin cross-arm, about ten or twelve feet long, and was owned by the defendant. It was mortised and bolted into the pole, and projected about five or six feet on each side of the pole. It was made of pine, and was three and three-fourths inches in perpendicular dimensions, by one and one-fourth inches in width. The pins or pegs are made of oak or ash, and are set in holes bored through the cross-arm. The wire the defendant had on the pole was called the "police circuit." Several days before the accident the line was reported to be in bad working order, and the plaintiff and J. W. Gates, another experienced lineman, were sent out from the defendant's office, to run over the line, repair it, and fix it up so that it would give better service. The plaintiff and all linemen in the defendant's service, and generally in all similar services, were required to supply themselves with the necessary tools to be used as lineman, which usually consisted of a pair of pliers, a screw driver, climbers, clamps, and a safety belt. The safety belt is worn by all linemen, and consisted of a belt or strap which went round the waist and the pole and fastened with "snaps," and was intended to prevent the lineman from falling while at work on the pole or cross-arm, and to enable him to work with both hands. It is from three to six feet long. Gates had all of the above-mentioned tools, including the safety belt. The plaintiff had all except a safety belt. The plaintiff and Gates started to repair and fix up the line. No foreman or superior officer went with them. They worked a day or two before the accident tightening wires, and doing whatever they found or deemed necessary to put the line in working order. Among other defects they found before they reached the pole and cross-arm in question were three or four cross-arms on other poles that were rotten and dangerous, and these they took out, and replaced them with new ones, which they got from the supply the defendant kept on hand for the purpose. They also tightened up the wires wherever they sagged, as



they also did the electric wires wherever they sagged down upon the telephone wires and interfered with the latter wires. When they reached the pole where the accident happened, about 11 o'clock in the morning, the plaintiff climbed the pole first, and got above the lower cross-arm,—the defendant's,—on the north side of the pole, and Gates climbed up the south side of the pole, and stopped with his waist at the cross-arm. They found that the electric wire on the top cross-arm sagged down so as to come in contact with the telephone wire on the lower cross-arm. They worked about an hour tightening the wires, and during that time the plaintiff stood upon the defendant's cross-arm, but close up to the pole. Gates got out on his side of the cross-arm, and tied a wire, and the cross-arm bore his weight, but he was a lighter man than the plaintiff, who was over five feet nine inches in height and weighed over 150 pounds. During the time they were at work, the peg or pin to which defendant's wire on the north side of the pole, where the plaintiff was working, broke, because of the strain of the wire upon it, which was greater because the wires ran from that pole at an angle. The plaintiff noticed the broken peg, and examined it, and found that it was rotten. When they had finished tightening the wires, the plaintiff unfastened the wire from the broken peg, and stepped out on the cross-arm about two feet from the pole for the purpose of tying the wire to the next peg further out on the cross-arm. When he did so, the cross-arm broke, he was thrown to the ground, and his leg broken. Afterwards it was discovered that the cross-arm was defective, having been affected with the dry rot.

Held—that plaintiff was guilty of contributory negligence as a matter of law, and, generally, a telephone lineman, charged by his employment with the duty of inspecting and repairing his employer's line, assumes by his contract of employment the risk arising from a defective cross-bar which breaks and causes his injury while he is repairing it.

Roberts vs. Missouri & K. Tel. Co., 66 S. W. Rep. (Mo.) 155.

STREET TELEPHONES.

William Gray of Hartford, Conn., has invented street telephone station boxes for the convenience of the public. Of this contrivance the inventor says:

"This is the first attempt to provide the public with convenient street stations, and there seems a future for it. So far, no returns are at hand to base any estimate of earnings, but there may be a public demand for it, which will insure a profitable business.

"These machines, which are of attractive design, ornamental as well as practical in construction, are to be placed on street corners, where they will be of the most use to the public and easy of access any hour of the day or night.

"This outdoor telephone is of the height and shape of a police signal box and the regulation fire alarm box, now in use on the streets of the city. The neat column that supports the box containing the telephone and the box itself have a white aluminum finish.

"The door of the box can be unlocked by dropping a cent in the slot, and the coin recovered when the door opens. Inside the box is the mechanical pay station telephone with the slots for dimes, nickels, etc., and on the reverse side of the door hangs a regular telephone directory. A receiver is attached to the back by a short arm, and beside it rests the transmitter, connection with the central office being made in the usual way. No money need be dropped into the slot until central reports connection with the person wanted.

"The door of the telephone box is on beveled hinges and closes itself by gravitation after the telephone has been used."

Free use of this system is offered by the inventor to the police and fire departments wherever installed, and also to citizens who may wish to call either of these departments.

One obstacle to be overcome in the introduction of the street system is the difficulty found in obtaining the consent of municipal authorities for installing them on the streets.

WELL-KNOWN HEADS OF WELL-KNOWN HOUSES

E. B. Overshiner.—The genial president of the Swedish-American Telephone Company, was born at Elwood, Ind., January 14, 1867, and is therefore one of the young men in the Independent telephone manufacturing business. After occupying a number of responsible positions, among which was a position of prominence with the Pennsylvania Railroad, Mr. Overshiner organized the Swedish-American Telephone Company, in 1899. Under his able management this company has steadily grown and prospered, and enjoys an enviable reputation in the trade. Like many similar enterprises, the beginning of the Swedish-American company was on a modest scale, but at present the factory of the company is turning out a large quantity of apparatus, which has a very general distribution.

E. B. OVERSHINER.

Mr. Overshiner, with that courtesy and consideration which is one of his prominent characteristics, ascribes much of his success and that of the Swedish-American company to his able associates in the business, but throughout the entire history of the company Mr. Overshiner's personality has been prominent.

It is not given to many men to count a larger circle of friends and acquaintances than Mr. Overshiner has in the Independent telephone business. His uniform kindness and sturdy honesty make him deserving of the success which he has attained.

EXCHANGE CONSTRUCTION.*

That the telephone has come to be a business necessity and a household convenience is generally conceded to be a fact. The demand for telephone service is, therefore, universal. The problem is to find the best way to supply this demand at a reasonable rate for services rendered and to insure a fair return on the money invested. The specific problem for the telephone engineer is to accomplish the best results in constructing a telephone exchange for the least original investment and at the smallest future expense for maintenance and repairs.

The construction work should be carefully and comprehensively planned and designed by a competent engineer who has had broad experience in that line of work. The work should be done in a thoroughly first-class manner, using only the best of materials of the kinds selected, and workmen skilled in their particular vocations should be employed.

The selection of a location for the central office or exchange is a matter of considerable importance. For each group of telephone subscribers there is a point called the center of distribution, from which the average length of subscribers' lines is a minimum. With the exchange located at that point, the cost of construction will usually be minimized; in some cases the saving to be derived on account of locating the office at the center of distribution is more than offset by the greater cost of real estate or rent, in which case it is often advisable to locate the office at a point removed from the center of distribution at which the annual saving on investment in real estate or rent will more than compensate for the increased cost of original investment. The center of distribution, for a given group of subscribers, is easily found by locating them on a map and drawing a horizontal line so that it will equally divide the subscribers so located; a vertical line is then drawn, dividing the locations as before. The intersection of these lines is the center of distribution. In locating the center of distribution due consideration must be given to the probable future growth of the business, as an unusual growth in a certain direction will tend to take the location in that direction.

It is usually more economical, from a purely financial standpoint, to rent quarters for an exchange than to purchase a lot and erect a building. There are other considerations, however, which often make it desirable for the telephone company to own its own quarters. The fact that the company owns real estate materially adds to the stability and permanency of the plant and has considerable influence with investors if bonds are to be sold.

If a building is built it should be of modern fireproof construction, and especially planned to best meet the requirements for which it is desired.

Before starting the outside construction of the plant, a reliable map of the city, drawn to a scale of 300 or 400 feet to the inch, should be secured, and upon it the work to be done should be planned. The subscribers secured should be plotted on this map, and the best routes by which to reach them marked. A thorough investigation of the territory to be covered should be made, and a plan selected for supplying the ultimate requirements of that territory for telephone service. The construction work to be done originally should in every case be in accordance with the ultimate plan; even though the original investment may be a little greater, a considerable saving will be made in the end. The map showing the ultimate development of the exchange should be kept on file for reference, and all future extensions should be made according to the prearranged plan whenever possible. It is advisable to have pole lines located in alleys where possible, as there is usually less objection to such locations and the interference from trees is much less. It is desirable to have main routes extending from the exchange in each of the available directions from the office; along these routes the wires and cables for all the branch routes and feeders should be grouped and brought into the office.

The municipal governments of many of the cities, and practically all of the larger ones, require that within certain limits all telephone and other wires shall be placed underground. In cities where this is not required at present, it is more than likely that it will be required within a few years, or at least within the life of pole lines which might be erected at this time. This method of construction is considerably more expensive than pole lines with aerial cables and wires, but when the decreased cost of maintenance and reconstruction, covering a number of years, is taken into account, underground construction is usually found economical, especially where a large number of circuits are to be run. The largest items of expense in laying underground conduits are the costs of excavating and repaving, these items being very little greater for a large number of ducts than for a small number of ducts. It is, therefore, important that a sufficient number of ducts be laid originally to meet all of the present and future requirements.

Vitrified clay conduits should be used, which may be of either the single or multiple duct type. Each type has some advantages over the other, but either will give very satisfactory results.

The conduits should be laid on a foundation of concrete, not less than four inches thick, and should be so protected on top that the liability to injury from laborers digging in the street, or from other causes, will be reduced to a minimum. Good protection is afforded by a 4-inch layer of concrete on the top of the ducts, or by simply placing a 2-inch plank on top of them before refilling. A plank is usually a more serious obstruction to a laborer's pick than concrete, and in a soil that is damp the greater part of the time a plank will last for a great many years.

Manholes should be built of two courses of hard-burned brick, laid in cement mortar as nearly watertight as possible. The manholes should be large enough and deep enough to afford plenty of room for drawing in and splicing cables up to the full capacity of the ducts entering them. The floor of the manhole should consist of not less than 6 inches of concrete and the walls built upon this floor as a foundation. Sewer connections to manholes are desirable, although not necessary. When sewer connections are not made, a sink hole should be placed in the center of the manhole floor; this may be made of a length of ordinary 10-inch sewer pipe.

The best form in which to construct a manhole is that of the longitudinal section of a barrel, and this should be used whenever possible. Manhole covers should be of cast iron, sufficiently strong to carry safely the heaviest load that may pass over them; they should be perforated with a number of holes to allow the escape of gases which may collect in the conduits and manholes.

The routes for pole lines, as designed on the map for ultimate development, should be strictly adhered to, and all poles should be set with the idea that they are to become a part of the general plan of the permanent plant. Considerable objection on the part of property owners along whose property poles are to be set, may often be avoided by the careful selection of poles to be used. Smooth, straight, well-proportioned poles can often be set where rough, crooked poles would not be permitted. The routes selected should be as free from trees as possible, and where trees are encountered poles should be sufficiently high to keep the open wires clear of foliage. The maximum number of cross-arms on any pole line should not exceed six. Where more than six cross-arms are necessary, it is more economical to erect aerial cable. All poles should be stepped, and under no circumstances should linemen or others be permitted to climb them with spurs or climbers. Poles for all city construction work should be painted. The painting of the poles does not add to their durability, but it usually re-

*Editor's Note.—Paper to be read before the Interstate Independent Telephone Association, Chicago, April 11, by W. H. Crumb, and furnished this publication through courtesy of the author.

flects credit on the company and in the end is a good investment.

One of the most important features of pole line construction is the guying and anchoring. All turns or angles in every pole line should be strongly guyed and all terminals and messenger wires firmly anchored. The original anchors and anchor rods set should be strong enough to hold any load which may thereafter be put upon them. The resultant strain of six cross-arms full of wires pulling at an angle of 150 or 160 degrees, is something usually difficult to comprehend, but it is ever present, working day and night, and eventually will weaken the strongest pole if it is not sufficiently guyed.

The use of telephone cable, both underground and aerial, has come to be a great factor in the construction of telephone exchanges. Experience has proven that the most efficient cables are those which have paper insulation for the wires, and the cores of which are enclosed in a lead sheath. Underground cables are made in sizes from 25 to 400 pairs; aerial cables containing more than 150 or 200 pairs are rarely erected. There is considerable difference in the practice of a number of the larger companies regarding the size of wire to be used for cable conductors, the sizes usually being Nos. 19, 20 or 22, B. & S. gauge. Where the length of the cable conductors do not exceed two miles, No. 22, B. & S. gauge, wire will give excellent results; in fact, wire of that gauge is giving excellent results in lengths considerably longer than that above mentioned. The insulation of the cable conductors, being composed of dry paper, must be kept absolutely dry; only those terminals should be used which will prevent the admission of moisture at the points where cables are terminated. The flexible terminal or pothead seems to more fully meet the requirements of a cable terminal than any form now upon the market. The cable conductors, especially those to which long aerial wires are connected, should be protected against lightning and electric light currents. These protectors should consist of a good fuse, a carbon and mica or silk lightning arrester, the ground plate of which should be well grounded.

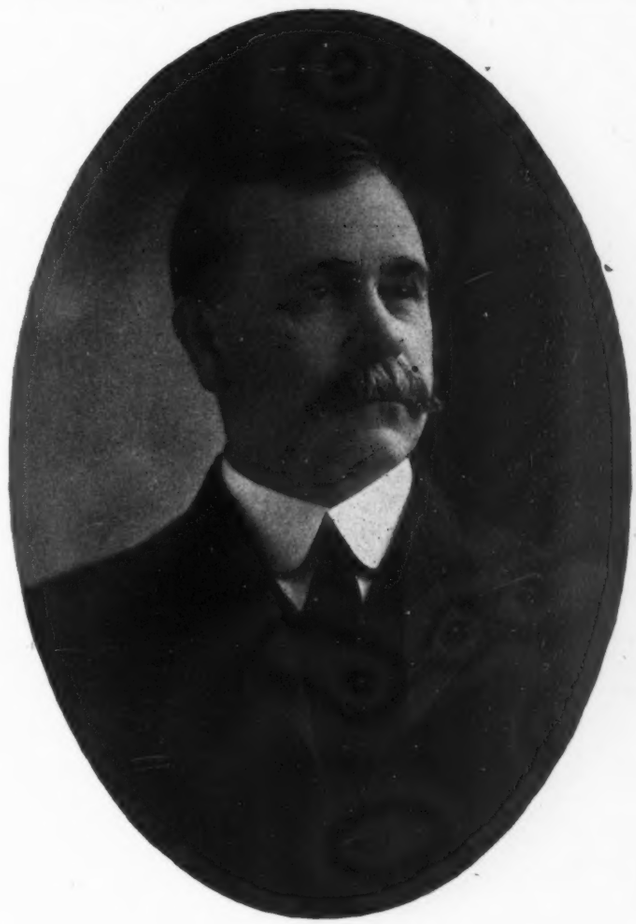
The multiple system of cable distribution should be used. In the old system of distribution a pair of cable conductors is available at only one point, and it is necessary to provide a sufficient number of extra cable conductors to take care of probable future increase in number of subscribers whose lines may extend from that distribution point. Experience has shown that the per cent of increase is much larger when subscribers are taken in small groups—that is, single distribution points—than when taken in large groups. By grouping a number of distribution points in one cable it is, therefore, more economical to have one pair of cable conductors available at two or more distributing points, thereby reducing the proportionate number of extra cable conductors, which represent an unproductive investment.

The kinds of wire to be used will depend largely upon the atmospheric conditions of the city in which the exchange is located. For medium size exchanges, where the atmosphere is comparatively free from soft coal smoke, galvanized iron wire will give excellent results and last about eight or ten years. All wire must be strung according to a prearranged plan, which must be observed in all cases. It is the usual practice to keep longer circuits on the top cross-arm, and when new circuits are strung the present circuits should be so cut over that the longest circuits will be in the position planned. All wires should occupy corresponding pins on all cross-arms.

After completing the construction of a plant, the matter of maintenance is of paramount importance. Many well-constructed exchanges have been permitted to deteriorate very rapidly through poor maintenance. Poles should be maintained in erect position and wires should be kept well pulled up. Temporary work should only be done when the same is absolutely necessary, and, when necessary, it should be replaced by permanent workmanship at the earliest possible date. It has been my experience that the majority of temporary work done on telephone exchange plants soon becomes permanent, and such work has a very great tendency to cause a very rapid deterioration of the property.

PROMINENT CEDAR POLE MAN.

Mr. W. T. Reynolds of Minneapolis, Minn., is one of the leading cedar pole dealers of the United States. He has been prominently connected with the lumber business since 1876, his first business association having been with the firm of Knapp, Stout & Co. of Dubuque, Iowa. In 1884 Mr. Reynolds started in business for himself and enjoyed a very prosperous wholesale trade. He removed to Minneapolis in 1897 in order to undertake a large cedar pole business, and has been exceptionally successful. His sale of



W. T. REYNOLDS.

cedar poles in 1901 was 100,000 pieces, and extended from Wyoming on the west to Oklahoma and Indian Territory on the South, the major portion of sales being made west of the Mississippi. A large distributing yard is maintained at Minnesota Transfer, from which point shipments are made. Mr. Reynolds enjoys a large circle of acquaintances in Minneapolis and St. Paul, and is well and favorably known throughout the telephone and lumber field of the West.

A bill was lately introduced by Senator Lodge, by request, to permit a new telephone company to operate in the District of Columbia. The company is known as the Telephone Company of America. The bill provides that the company shall put telephones in every house and office in the district, free of charge, and answer calls at 2 cents a message. It further provides that the company may maintain the necessary conduits, but cannot string overhead wires on the street. The work of construction must be begun within six months.

A MODEL TELEPHONE PLANT.

One of the most up-to-date Independent telephone exchanges in the state of New York has just been completed for the Interstate Telephone Company of Little Falls, New York. The switchboard consists of two sections of the latest type central energy lamp signal board, and is equipped for 500 metallic lines and has a capacity for 2,000 multiple. It has four operator's positions. The first, or trunking position, to toll board is equipped with five incoming signal

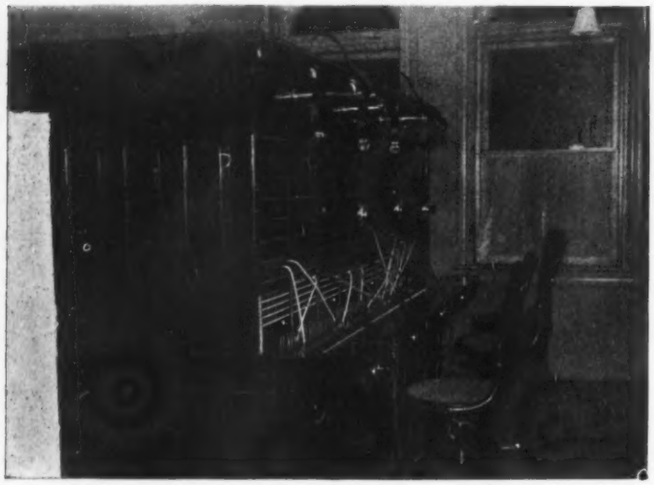


FIG. 1—SWITCHBOARD, INTERSTATE TELEPHONE COMPANY.

trunk cords and five out-going or recording trunk circuits, which are multipled to all other operators' positions. The other operators' positions are equipped with 160 answering jack and complete multiple jacks, sixteen pairs of cords, combined ringing and listening keys, line and supervisory pilot lamps, adjustable suspended transmitters, head telephones terminating in operators' cut-in jacks, two to each position.

The toll board which is situated in a toll room adjoin-

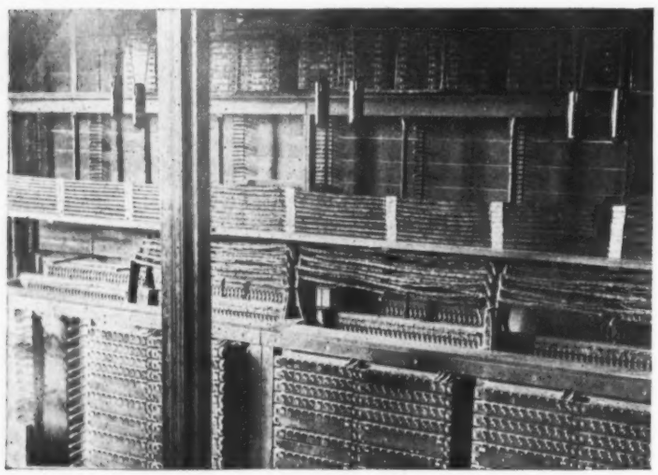


FIG. 2—REAR OF SWITCHBOARD, INTERSTATE TELEPHONE COMPANY.

ing the switchboard room, is a two-position mahogany finished board, equipped for ten toll lines, five recording toll trunks, five incoming trunks and order wire circuit. The switchboard is not so remarkable for its size as for its equipment.

The system used is the common battery relay system; the batteries for talking as well as for signaling all being located at the central office. The telephones used by the subscribers do not contain any battery or generator. The subscriber signals the exchange by simply taking his receiver off the hook, this operation lights a small incandescent lamp at the switchboard, which lamp obtains its current from the storage battery located at the exchange, and serving as a common battery.

In Fig. 1 is shown a front view of the switchboard, which shows the rows of lamps, having the appearance of a row of pearls owing to the lamps being covered by jeweled caps, or lenses, and every time a lamp lights, the operator inserts a plug into the jack located immediately above the lamp which connects her to the calling subscriber. After she has ascertained the desired number from the calling subscriber she inserts a second plug, which is connected to the first plug by a cord, into the multiple jack as shown. Each operator has all subscribers represented by multiple jacks in front of her so as to enable her to reach any subscriber in the exchange. This has been found to be the best method for rapid service. With each pair of plugs there is associated small lamps which serve as supervisory connections. As soon as the operator has inserted the second plug into the multiple jack of the called for subscriber, the supervisory lamp associated with the calling plug will light, indicating to the operator that the desired subscriber has his receiver still upon the hook. At the time of inserting the calling plug, the operator rings the called for subscriber by means of a ringing key, and as

FIG. 3—POWER MACHINES, INTERSTATE TELEPHONE COMPANY.

long as the lamp associated with the calling plug remains lighted, she knows that the called for subscriber has not responded. As soon as he responds, the lamp will be extinguished and the operator knows that the desired subscriber has answered the call. The supervisory lamp associated with the answering plug, i. e., with the plug the operator used to insert into the jack above the lamps of the calling subscriber, does not need to light at the present, because the operator already knows that the calling subscriber is ready for conversation and waiting at his telephone. Therefore as soon as the operator sees both lamps extinguished, and both plugs in the jacks, she knows that the subscribers are in conversation. Whenever one of the two subscribers hangs up his receiver, he lights the supervisory lamp associated with the plug that is inserted in his jack. When, therefore, both of the supervisory lamps are lighted, the operator knows that both subscribers have finished conversation, and she can restore the plugs to their normal condition. It would not be sufficient to see one lamp lighted, as one of the subscribers may have temporarily hung up his telephone and gone after some information, intending to take up the conversation immediately. The two lamp supervision is the most modern and the only effective method of supervising a conversation.

Fig. 2 represents the rear of the switchboard. In the lower part the relays are shown, and above the relays, the cables terminating at the jacks and lamps. In the upper

part of the switchboard a bank of condensers is shown, these condensers being used in the operators' cord equipment, and serve for the transmission of the sound from one part of the circuit into the other.

Above the condensers are such coils as are required for the operators' outfit to enable her to talk to the subscribers as well as to test whether the line of the called for subscriber is free. Each operator is provided with two pilot lamps, one of which is lighted every time the line lamp of a calling subscriber lights, and the other one is lighted every time one of the supervisory lamps lights.

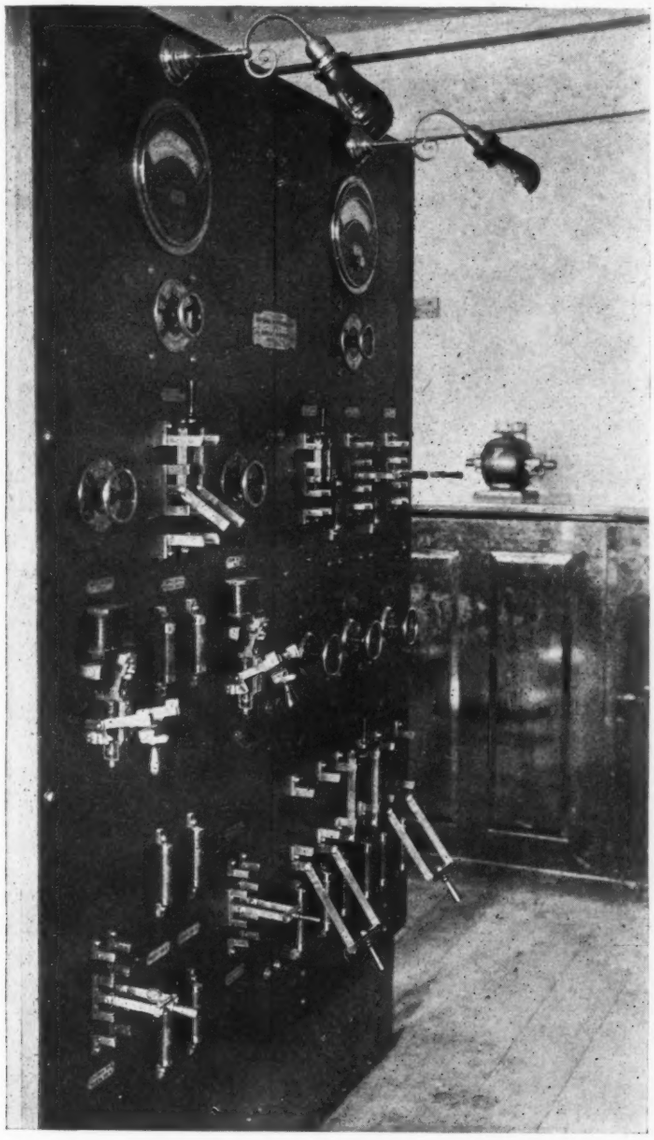


FIG. 4—POWER BOARD, INTERSTATE TELEPHONE COMPANY.

In this manner each operator knows by the lighting of the pilot lamp when the call came in, or when the subscriber hung up his receiver. During night time a night bell is connected in this pilot circuit and every time a pilot lamp lights the bell begins to ring.

Figs. 3 and 4 shows the power machines and the power board. The power machines consist of a duplicate set of Holtzer-Cabot direct-connected motors and generators for charging batteries. The power board consists of a one-half panel slate slab, with regulation switches and automatic overload and underload circuit breakers, starting boxes, flush pattern Weston ammeter and voltmeter, two sets of eleven cell each storage batteries of one hundred ampere hour type. These storage batteries are shown in Fig. 5, in the cabinet, one above the other, together with one direct-connected motor and generator for ringing purposes, and one emergency battery ringer. In Fig. 6 is shown a rear view of the power board.

In the line construction everything has been done, and

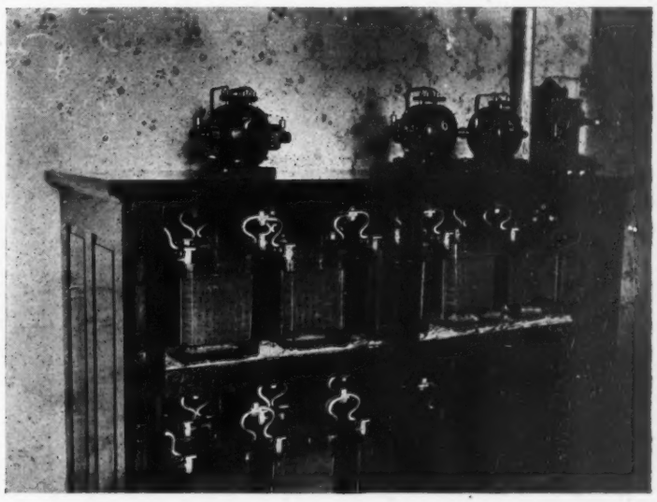


FIG. 5—BATTERY CABINET, INTERSTATE TELEPHONE COMPANY.

no expense has been spared to make the plant second to none in the United States. The outside construction consists of over fifteen thousand feet of cable. All service wire is No. 12 copper. All subscribers' sets have No. 14 rubber covered, twisted pairs. The company has at present

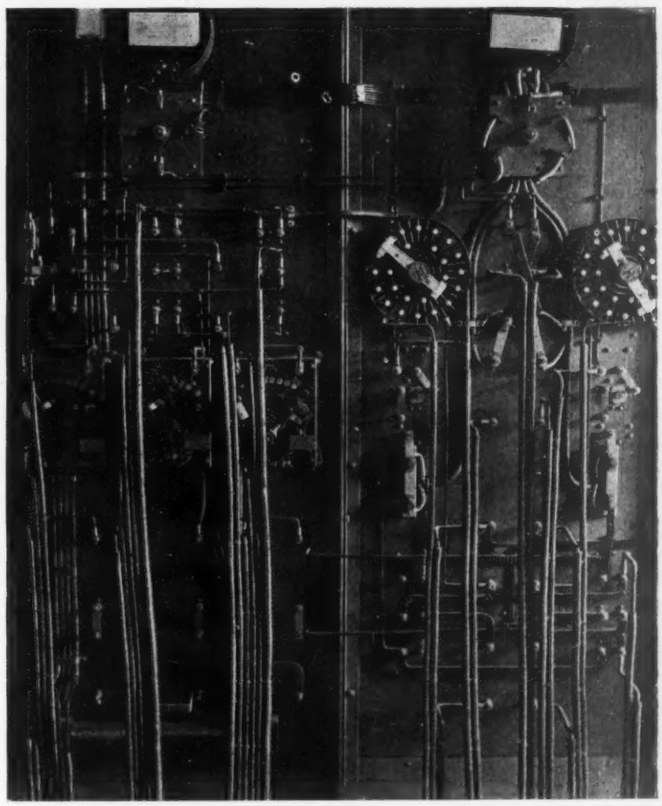


FIG. 6—REAR OF POWER BOARD, INTERSTATE TELEPHONE COMPANY.

three hundred subscribers in Little Falls, also an exchange in Dolgeville, Newville, St. Johnsville, Fort Plain and Canajoharie, installed by the North Electric Company of Cleveland, Ohio. The business is increasing at the rate of over fifteen subscribers per week and altogether the outlook for the future is bright indeed.

The officers of the company are: Eugene Walrath, president; John Hurley, vice-president; Geo. G. Hakes, secretary and manager; Geo. D. Smith, treasurer.

The central energy exchange, including toll-board, power equipment, arresters, frames, etc., was completely installed by the Kellogg Switchboard & Supply Company of Chicago, and ever since the first day of operation has given great satisfaction to the Interstate Telephone Company.

MEETING OF IOWA TELEPHONE ASSOCIATION.

The meeting of the Iowa Telephone Association, held at Des Moines on March 11 and 12, was a thoroughly representative gathering of exchange and toll line men from Iowa and adjoining states. A large delegation of leading manufacturers and supply house men was also present. The convention was one of the most practical and helpful meetings ever held by an Independent association, and is a long step forward in the progress of the anti-monopoly movement in the Hawkeye State.

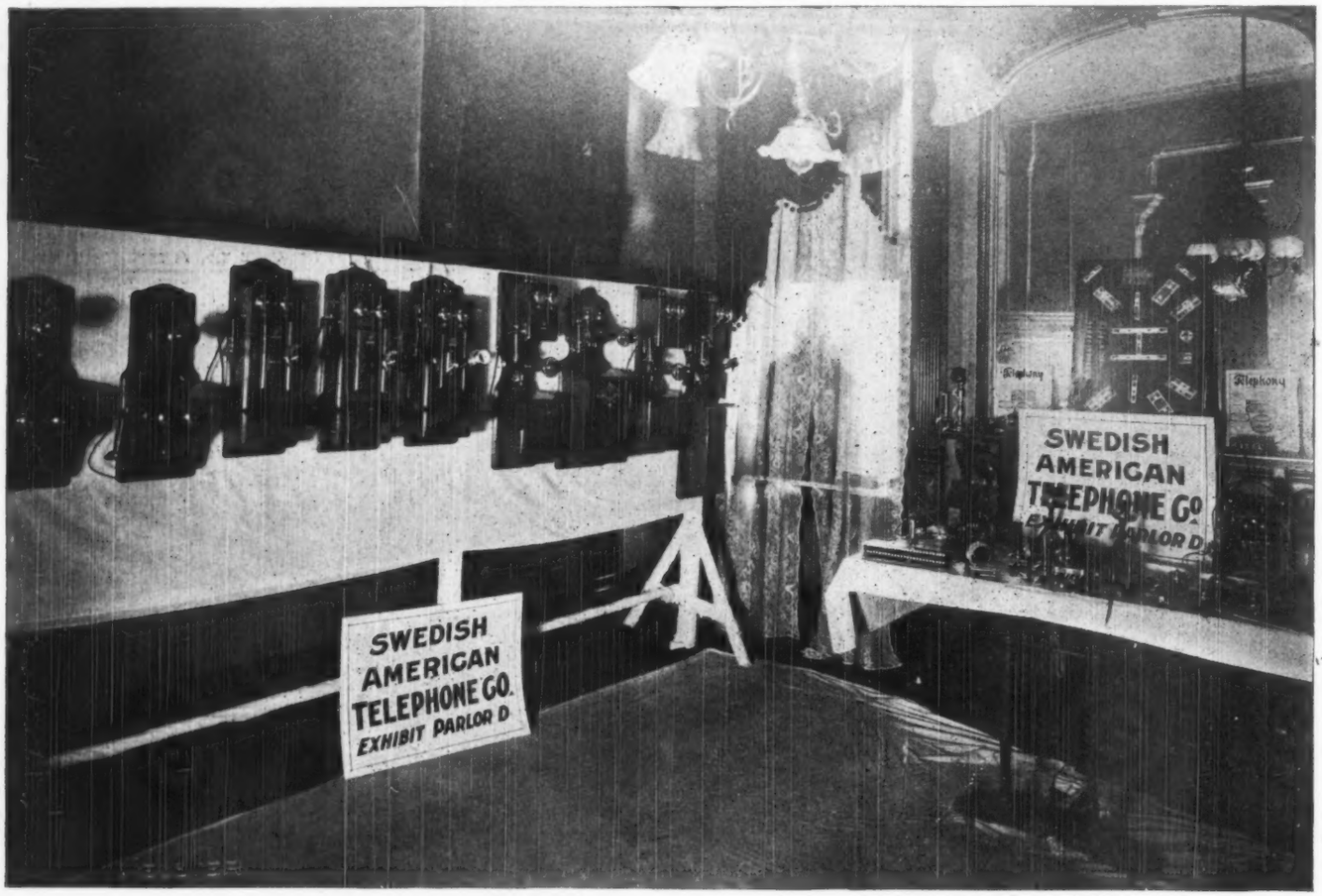


EXHIBIT SWEDISH-AMERICAN TELEPHONE COMPANY AT IOWA TELEPHONE CONVENTION, DES MOINES.

The annual address of President H. C. Raney of Fairfield practically served as a text for the later discussions and papers of the convention. Mr. Raney summed up the situation in Iowa under three heads, which would practically embrace all existing problems in telephone operation. The first need was for a more systematic connection of the various Independent telephone companies doing business throughout the state. The second necessity was better and more complete long-distance toll line connections. The third requirement was freedom from harrassing and hostile legislation. The solving of the first problem was one of mutual interest, and capable of accomplishment by the simple application of ordinary business sense. The second problem was one requiring only reciprocal honesty and fairness of present companies with each other, and co-operation in mutual effort to increase and improve existing facilities, while aiding in every way the promotion of new lines. As to the problem of legislation, an exact compliance with just laws is the best guarantee of fair treatment in the enactment of future legislative and municipal acts. No class of business, or companies, properly serving the interests of the public would need to fear hostile legislation from its representatives.

The reports of the secretary and treasurer to the convention showed the association to be in a strong condition as to membership and finances, and were replete with evidences of the benefit of the association's work.

There being a large amount of routine and special business to be attended to by the officers and committees, an adjournment was taken immediately after the delivery of the president's address, and the delegates spent the remainder of the day in the inspection of the numerous exhibits made by manufacturers.

The second day's session was noteworthy for the number of able papers read.

Dr. Henry S. Herr of Ottumwa, in a practical address, advocated the formation of an "Independent Telephone Clearing House," urging that a central, impartial body, properly clothed with necessary powers, would afford the best and most practical method of fairly adjusting the constantly arising disputes between various telephone companies.

Dr. Bennett of Waterloo followed with "One Year's Experience With a Checking Bureau," in which the urgent need of such a bureau for the equitable checking up of toll line charges and accounts was forcibly portrayed. Dr. Bennett, from his own practical experience, was able to give a demonstration of the working efficiency of such a bureau. The two papers of Drs. Herr and Bennett were listened to with great interest, and their discussion consti-

tuted one of the features of the convention. A committee consisting of C. B. Dobie of Sigourney, A. T. Presson of Iowa City and Charles C. Deering of Boone was appointed, with instructions to thoroughly investigate the subjects of clearing house and checking bureaus, and report at the next meeting of this association.

Interesting and practical papers were read by Messrs. George N. Bandy of Perry and E. H. Martin of Webster City on "Toll Line Traffic" and "An Iowa Tariff Book," respectively. These papers were the results of actual experience and observation of present needs, and were of especial value for the many suggestions contained looking toward improvement in existing conditions.

Mr. P. C. Holdoegel of Rockwell City held the close attention of the delegates during his reading of a paper on "Our Duty to Each Other." Mr. Holdoegel warned the Independent telephone companies comprising the Iowa Association not to be betrayed by the common enemy or led into the still greater danger of quarrels among themselves. He urged co-operation and fairmindedness in mutual dealing and said that a spirit of harmony in action was essential to Independent success.

This paper was followed by one entitled "What I Know of the Farm Movement," by F. C. Musson of Atlantic, who graphically and in an interesting manner detailed incidents of the remarkable growth of rural telephone lines. The importance of the farmer in the telephone business of the future is not to be exaggerated and is of the greatest interest to students of Independent telephone development.

Growing out of the papers and discussions of the convention, a resolution was presented providing for the settlement of disputes between different companies by arbitration, and providing for compulsory acceptance of the findings of such arbitration board.

The election of officers for the ensuing year concluded the proceedings of the convention. The new officers are:

President, U. S. Alderman, Nevada.

Vice-President, Henry S. Herr, Ottumwa.

Secretary and treasurer, Charles C. Deering, Boone.

The new executive committee consists of H. C. Raney, Fairfield; Charles Kirk, Chariton; J. S. Bellamy, Knoxville, and George N. Bandy, Perry.

BRITISH TELEPHONE LAWS.

(From our London Correspondent.)

The postoffice authorities opened the central exchange, i. e., that one dealing with the center of the city of London, on February 24, when there were about 200 subscribers' lines completed, the said subscribers having connection with about ten exchanges of the National Telephone Company. As a matter of fact, however, nearly 2,500 agreements have been entered into with persons desiring a telephone service at the hands of the postoffice. In addition to the city exchange the exchanges at Putney, Cheswick and Kingston are practically in a position to commence connecting subscribers, whilst the Croydon, Mayfair, Marylebore and Bayswater exchanges will be completed by the end of the year. The junction lines between the postoffice central exchange and the trunk wire system of the country are also now connected up.

The central exchange, by reason of its prior opening, has created some interest and the following technical particulars of its equipment will be interesting. The organization of this exchange has provided accommodation for 14,500 subscribers, and it is situated in an existing government building, part of which is devoted to the savings bank department. The two basements and the top floor of this building have been allotted to the telephone department. The provision in the basements for the entry of the ducts containing the cables is for 46,438 pairs of wires, viz., 214 ducts each carrying a cable embodying 214 pairs of wires. These conductors are paper and air insulated and this insulation obviously depending upon the exclusion of moisture, arrangements are made for a pressure of ten pounds to be always on the cable, motor driven air pumps being the medium by which this object is attained. The system of communication adopted is the central battery system and the power plant consists of two motor-generators each composed of a 25-horsepower four-pole, shunt-wound motor, direct coupled through a flexible shaft to a four-pole shunt-wound generator running at 650 revolutions per minute and having an output of 500 amperes at 30 volts. Through the instrumentality of a Cutler-Hammer starting box fitted with an electro-magnetic release, the circuit is opened in the case of an overload or failure of current, and a resistance is automatically inserted in the field. A Ward-Leonard rheostat regulates the voltage of each generator, each of the latter being connected to 11 C. B. chloride cells. At present there are two installed, their normal output being 2,000 ampere hours at a 250 ampere discharge rate. The ringing current is supplied by a couple of two ampere 75-volt generators running at 1,000 revolutions per minute. One of the most interesting features of the switch room is the rack of meters utilized for subscribers on the message rate system. From the system adopted here the subscriber receives a periodical statement of the number of calls recorded by his meter during that time. On the face of it one is left to suppose that other calls besides business ones could be made without the subscriber himself knowing it but for which he would have to pay. Possibly he is expected to guard against his employes using his telephone for private use, as no record is made at the exchange of either the day or the time.

Again does the Tunbridge Wells Corporation claim special attention in connection with matters telephonic, on this occasion by reason of the publication of the accounts of their municipal telephone service up to date, which have been compiled for the purposes of a local government board inquiry into an application on the part of the local authority to borrow money to extend the system. By this statement of expenditure and revenue, on an average subscription of £4 11 5 per line, a profit of £655 is shown after allowing for contingencies, royalty, interest and redemption of previous loan. At the present rate of increase of subscribers a profit of over £1,000 is looked for at the end of the next period.

On a much grander scale are the accounts of the National Telephone Company for the half year ended December 31, 1901. During this period the income was £801,495 4 8, which is an increase of £69,402 0 7 over the receipts during the corresponding half year in 1900. Postoffice royalties accounted for £73,423 2 3 and the profits amounted to £283,680 8 9, compared with £255,831 5 8 for the half year ended December 31, 1900. A 6 per cent dividend is recommended on the first and second preference shares, 5 per cent on the third preference shares, 6 per cent on the preferred shares and stock and 4½ per cent on the preferred stock. After transferring £100,000 to the reserve fund, a sum of £7,316 12 0 is carried forward. In the report of the board of directors reference is made to the negotiations with the postoffice apropos of the London telephone service and the fact that these negotiations have resulted in a working agreement. This matter was also laid stress upon in the chairman's speech at the annual general meeting, the gist of the speech being much on the same lines as the arguments adduced by the government during the famous parliamentary debate upon the question.

At Glasgow the total number of subscribers to the municipal system has now reached 6,400 and additional applications are coming in rapidly.

It is announced that the postoffice authorities, acting in co-operation with the Belgian government, are contemplating the laying of a new telephone cable between England and the Continent which will allow of through telephonic communication between London, Brussels and Antwerp. The distance between the two landing places is to

be about fifty-six miles, viz., Dover in England and La Panne in Belgium.

The Leeds local authority, which has up to now been included as a partner in the Manchester combine, appears now very willing to desert the bill, although it has reached such an advanced state in its parliamentary career. It is not felt, however, that this defection will constitute any very serious obstruction to the ultimate passing of the bill. The National Telephone Company bill seeking extensions of powers in their Manchester area is meeting with much opposition on the part of the respective local authorities, but progress so far with the majority of this year's measures is not sufficient to give any indication of their likely success or otherwise.

At Aberdeen, in Scotland, a special committee of the corporation have been negotiating with the National Telephone Company for some time on the basis of an extended tenure of twenty-five years to the company and a charge of £6 6 0, but a refusal to accept these terms has stimulated the corporation to very prompt action on this matter and a postoffice license is to be applied for. In a similar manner each week sees the number of town councils making inquiries to the probable success of a municipal service increase enormously.

SOUTHERN INDEPENDENT TELEPHONE ASSOCIATION.

March 19, 1902, marks the beginning of a new era in the history of Independent telephony in the South. On that date the Southern Independent Telephone Association was

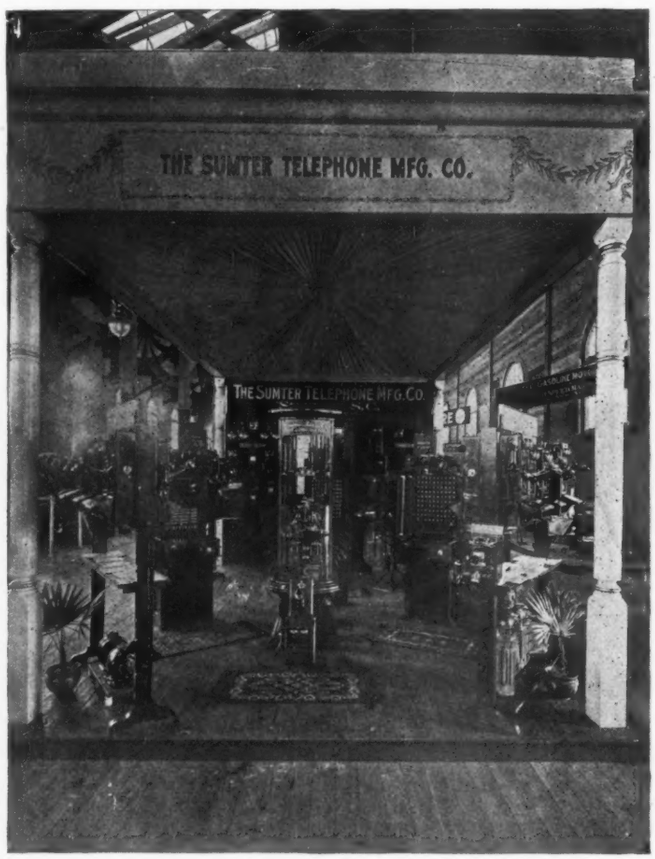
SUMTER EXHIBIT, SOUTHERN INDEPENDENT CONVENTION.

organized at Charleston, S. C. In the historic old city, whose name is so closely associated with the traditions of the South, at the Auditorium building on the Exposition grounds, the Independent telephone men of South Carolina, North Carolina, Virginia, Georgia and Florida met for the purpose of uniting their strength in the development of the southern telephone field, and to take concerted measures in opposition to the southern branch of the erstwhile Bell monopoly.

The movement which culminated in the formation of the Southern Independent Telephone Association, has been in progress for several months. Mr. S. B. Alexander, Jr., president of the S. B. Alexander, Jr. Company of Charlotte, N. C.; Mr. F. C. Manning, general manager of the Sumter Telephone Manufacturing Company, of Sumter, S. C., and Mr. F. V. L. Turner, general manager of the Atlanta Standard Telephone Company, of Atlanta, Ga., together with several other Independent telephone men from southern states, were the pioneers in the organization of the Southern Association. They arranged for March 19, as Independent Telephone Day at the Charleston Exposition. About one hundred representatives of Independent exchanges were present at the convention hall, and enthusiastically endorsed the new association.

The resolution providing for membership in the association is sufficiently broad to secure the cooperation of all southern Independents, and was unanimously adopted by the convention. It is as follows:

Resolved, That the Southern Independent Telephone



SUMTER EXHIBIT AT CHARLESTON EXPOSITION.

Association shall consist of persons engaged in the operating of Independent telephone exchanges and Independent toll lines."

It was also resolved that manufacturers and dealers in telephones and telephone supplies should be admitted as associate members of the association.

The first officers of the association were then unanimously elected. They are:

President—F. V. L. Turner, Atlanta, Ga.
First Vice-President—W. G. Brorein, Tampa, Fla.
Second Vice-President—W. B. Moore, Yorksville, S. C.
Third Vice-President—W. W. Shaw, Durham, N. C.
Secretary and Treasurer—P. D. Langdon, Augusta, Ga.

The president was authorized to appoint an executive board, to consist of one representative of each state included in the association.

Of the officers of the new association, Mr. Turner, president, has had a long and varied experience with the Bell Company and with various large Independent companies both North and South. At present he is general manager

of the Atlanta Standard Telephone Company, of Atlanta, Ga., probably the largest individual Independent telephone exchange in the South.

Mr. W. G. Brorein, first vice-president, is a well-known telephone man, of long experience in Ohio and adjoining states. He is now president of the Peninsula Telephone Company, of Tampa, Florida.

Mr. W. B. Moore, second vice-president, is president of the Bedford Telephone Company, of Yorkville, S. C., and also controls a large toll line system in that state.

Mr. W. W. Shaw, third vice-president, has made an enviable reputation as general manager of the extensive system of the Interstate Telephone and Telegraph Company, with headquarters at Durham, N. C., and is a widely known Independent telephone man.

Mr. P. D. Langdon, secretary and treasurer, is a prominent business man of Augusta, Ga., and is extensively interested in telephone properties. He is president of the Augusta Telephone and Electric Company.

The importance of an organization of southern Independents has long been recognized, and the influence of the present association will be widely felt in all the states south of Mason and Dixon's line. At the convention, delegates from companies having in service almost 150,000 Independent telephones were present, and at the next meeting, which is to be held in the spring of 1903, it is expected that half a million Independent telephones will be represented. The present movement is to be extended to cover every southern state east of the Mississippi river.

The constitution of the National Independent Telephone Association, was adopted, with slight modifications, as the constitution of the Southern Independent Telephone Association. Before the next meeting of the association, an extended organization of the Independent interests of the South will be perfected, and the united efforts of all members will be given to the promotion of Independent exchanges and toll lines throughout the entire South.

No field for Independent progress is broader or more ready for development, than that of the southern states. The unsatisfactory and inefficient service of the Southern Bell Telephone Company has matched the poor service of Bell companies in the North. Independent telephony is one of the great factors in present southern life, and southern Independent telephone men are characterized by all the vim and enthusiasm of their northern brethren. Their growth has been steady in numbers and influence, and with the added impetus of a powerful organization there is no limit to the extent of the development of the southern Independent movement. No greater evidence of this fact could be given than the enthusiasm of the Charleston meeting.

The delegates at the convention spent considerable time in the inspection of exhibits made by southern telephone manufacturers, at the exposition grounds, and the general unanimity of sentiment between exchange men, manufacturers and supply dealers is a forerunner of the future success of the Southern Independent Telephone Association.

SUMTER TELEPHONE MANUFACTURING COMPANY.

The delegates to the convention of the Southern Independent Telephone Association, held on the exposition grounds in Charleston, S. C., on March 19, were much interested in the very complete and artistic exhibit of the Sumter Telephone Manufacturing Company. This exhibit, a view of which is shown herewith, is located in the Machinery building. A complete line of central energy and magneto telephones and switchboards is exhibited, and to the practical telephone man of technical mind it is readily apparent that the apparatus is up to date and embraces the latest methods developed in the most advanced state of the art. Telephones of various types and for sundry purposes are shown in operation with the several systems of local battery and central energy switchboard. A very beautiful and compact type of wall set, and known as the company's No. 50, New Beauty, is shown in both the magneto and central energy style. One of the switchboards exhibited is of the well-known Sumter bullseye express type, the drop and jack being of the combined drop and jack type and employing an inwardly falling automatically self-restoring shutter. The company also exhibited a very handsome 100-line central energy switchboard in operation. The switchboard cabinet is made of highly piano-finished curly walnut, thus rendering the appearance of the cabinet in keeping with the superior efficiency of the system. A number of very handsomely finished cabinets are shown in curly walnut, maple, mahogany and various other hardwoods, all of which are made from the log upon the band saw mill operated by this company in connection with its large and well-equipped plant.

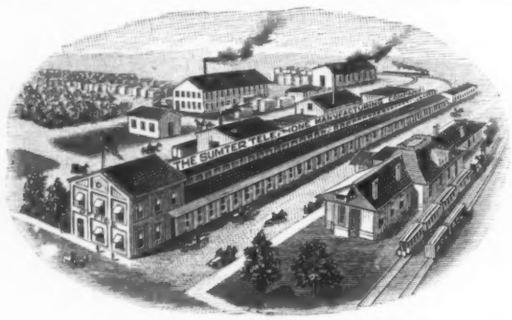
F. V. L. TURNER.

F. C. MANNING.

S. B. ALEXANDER, JR.

It is generally known that this company enjoys the distinction of manufacturing in its own works everything entering into the construction of the entire line of apparatus. The arrangement of the exhibit is, as a whole, very artistic and handsome and is a striking example of the rapid development in the manufacturing enterprises of the South. The company enjoys a liberal demand for its apparatus throughout the United States, Canada and other foreign countries.

The following are some of its recent Sumter installations (exchange equipments): Carolina Telephone and Telegraph Company, Kinston, N. C., 300-drop electric flashlight transfer express board and telephones; Greenwood Telephone Company, Greenwood, S. C., 300-drop outfit, same as above; Beaufort Telephone Company, Beaufort, S. C., 100-drop switchboard and outfit; Carolina Telephone & Telegraph Company, Scotland Neck, N. C., 100-drop board and



BIRDSEYE VIEW SUMTER FACTORY.

telephones; Carolina Telephone & Telegraph Company, Wilson, N. C., 300-drop express switchboard; the Jennie Atchley Company, Beeville, Tex., 100-drop switchboard and exchange outfit; High Point Telephone Company, High Point, N. C., 100-drop switchboard and telephones; Martinsville Telephone Company, Martinsville, Va., 200-drop switchboard and exchange outfit; Lancaster (S. C.) Telephone Company, 200-drop switchboard; Tidewater Telephone Company, Tidewater, Va., two switchboards and 175 New Beauty telephones; People's Telephone Company, Morgantown, W. Va., 200-drop switchboard, 100 New Beauty telephones.

WIRELESS TELEPHONY EXPERIMENTS ALONG THE POTOMAC.

Some fairly satisfactory wireless telephony tests were recently made on the Potomac River above Georgetown. The test was public and was conducted by Nathaniel Stubblefield of Lexington, Ky., says Electricity. The trial consisted in sending messages and transmitting sound between two stations on land and between the shore and a steamer which lay several hundred yards out in the stream.

Owing to the insufficiency of the battery on the vessel the tests were not altogether satisfactory to the inventor, although short sentences and parts of sentences could be distinctly heard.

A musical instrument in the shore station could be clearly heard by those on the boat, and the familiar strains of "The Georgia Camp Meeting," "Home, Sweet Home," "The Last Rose of Summer" and other well-known melodies were easily recognized.

The land tests were more satisfactory. Members of the party scattered, each group being provided with a receiver and a pair of wire rods attached to twenty feet of ordinary telephone cord or wire. From this cord were hung the receiver and transmitter, such as are used on any ordinary telephone. The rods were planted in the ground at the will of those handling them and sound work was distinctly transmitted.

Complete sentences, figures and music could be heard, so it is claimed, at a distance of several hundred yards from the shore station. This part of the experiment was pronounced a marked success, although the inventor declared that it was far from satisfactory to him, as he professed to have obtained better results at greater distances in private tests.

The apparatus made use of consisted, according to the dispatch, of ordinary transmitters and receivers, of a buzzer, an induction coil, two rods of about three feet in length and short pieces of wire connecting the poles.

Although the results so far obtained in wireless telephony are by no means startling or extraordinary, progress is being made, and the day is not far distant when messages will be transmitted without wires and by word of mouth over considerable distance.

A. J. ROUSSEAU.

The subject of this sketch, Mr. A. J. Rousseau, is an old-time telephone man, having been identified with the work since the early eighties. His first telephone experience was secured with the Chicago Telephone Company. After a number of years' service in the various departments of this company he entered the employ of the Rocky Mountain Telephone Company, with headquarters at Denver, after which he was with the Southwestern Telephone & Telegraph

A. J. ROUSSEAU.

Company of Texas. He entered the Independent telephone field in 1895. He has been identified with the Phœnix Telephone Manufacturing Company, Victor Telephone Manufacturing Company, Kellogg Switchboard & Supply Company and Stromberg-Carlson Telephone Manufacturing Company, being at present associated with the latter company. Mr. Rousseau is a young man and an enthusiastic worker. He is well known in telephone and electrical circles and enjoys a high degre of popularity.

FARMERS' TELEPHONES.*

It has been said by one of our most prominent Independent telephone men that the farmers have not learned to appreciate what a great blessing the telephone is to them. This saying is a true one, but it can also be said that they are learning its value rapidly, and in western Michigan, at least, they are ordering telephones faster than the telephone companies can install them.

The Citizens' Company of Grand Rapids has installed about 500 farmers' telephones during the last twelve months and we have orders on our books for 150 more. Add to this list the number installed during the same time by other Independent telephone companies operating in western Michigan, and it would seem to indicate that the farmers in our part of the country have decided that the telephone is a good thing and that they must have it.

The telephone benefits the farmer in a good many ways.

It promotes sociability and brings him in closer touch with his neighbors. During the long winter days, when the ground is covered with snow and the blizzard reigns supreme in the land, the telephone becomes the country newspaper. The man who is lucky enough to get his paper tells his less favored neighbor the more important news. The village postmaster, at the request of his customer, reads him his own and sometimes his neighbor's postal card, which tells of a new tooth which daughter Susan's baby had last week, and other very important news.

At election time he knows as soon as his city brother which candidate won, and how large the majority.

If he is interested in sport, he knows in less than ten minutes after it has happened that the Harlem Kid has knocked out the Kansas City Wonder in the 54th round.

His barn catches on fire, and by use of the telephone he summons his neighbors and saves his house from also burning down. His haystacks are blown down and a coming storm threatens them. His neighbors are again called in and the hay is stacked before the threatened downpour reaches them.

The child is sick and the doctor is called for; the telephone reaches him in time to save the child's life.

With properly constructed lines and first-class apparatus, and at a proper rate, it is a money-earner.

In towns where you have some difficulty in getting subscribers for your local exchange, it beats any solicitor that you can send out. The village merchant must have the same telephone that his farmer customer has or he will lose his trade.

Where you own toll lines you will find that an increased number of farmers' lines will increase your toll business wonderfully.

But if you build your farmers' lines of tamarack, or 4-inch top cedar poles; if you use fence wire instead of good telephone wire; if you buy telephones because they are cheap and not because they are good; if you make $6 rates instead of $15, no matter how many you have on a line; if you make free county service when your rates should entitle your customer to service only with other subscribers of the exchange that he is a part of; if you use cheap and second-hand switchboards instead of first-class goods; if you do any or all of the above things, you will wish before you are through with it that farmers' lines had never been heard of, and what might have been the strongest part of your system soon becomes the weakest.

It might be well at this juncture to figure what price should be charged for farmers' telephones with, say, six on a line, within four miles of the central office.

These rates apply only to village exchanges and will have to be changed considerably to apply to city exchanges.

A first-class bracket line, built of 5 and 6 inch top cedar poles, 35 to the mile, poles properly set and corners well guyed, with one circuit of No. 12 iron, will cost between $125 and $130 a mile.

A first-class six-pin cross-arm line, with three circuits of No. 12 iron wire, will cost about $185 a mile.

Figuring $125 a mile and adding cost of telephones, installation, etc., six telephones on the bracket line, four miles out, will cost $585, or about $97.50 per telephone.

Figuring $185 a mile, and adding cost of telephones, installation, etc., eighteen telephones on three circuits, four miles out, will cost $995, or about $55 each.

I find on looking over the construction account of several of our village exchanges that the average cost per farmers' telephone is about $70, and with that to figure from we can decide the rate which is a fair one for the telephone company and for the customer.

A $12 rate, after allowing for commission, maintenance, taxes and depreciation, will earn us 6 per cent. A $15 rate, making the same allowances, will earn us 10 per cent.

The company that I am interested with has made a great many $12 rates, and will no doubt continue to do so in that part of our territory where the rate is now established, but in new territory the $15 rate will be the standard, and I thoroughly believe that we will get as much business at the new rate as we did at the old one.

It has just struck me that some of you may have different ideas from what I have in regard to the necessity of making all farmers' lines, and in fact all telephone lines, metallic circuit. The above figures apply to metallic circuits only.

In this day of high-tension currents and electric roads, a metallic circuit is a necessity, and there is no town so small and no country so sparsely settled but what one of these two disturbers of quiet lines will soon be found.

Answering the question asked me in regard to what rate should be charged per year for each additional mile, I consider that $5 per mile additional would be about right if two or more telephones could be added for each mile.

Thus, if the rate for a six-party line, four miles out, is $15 per year per telephone, the rate for a five-mile line would be $20 each, a six-mile line $25, and so on.

The subscribers inside of the four-mile limit will pay their regular rate of $15, and those outside pay the higher rate.

The above figures are arrived at in this way: If your average telephone on a six-party, four-mile line costs $70, the total cost will be $420, and as the six telephones, including cost of installation and central office connection, will be about $85, it leaves $335 for the cost of four miles of line, or $84 per mile.

The average six-mile line will cost, according to above figures, $504, which, added to the cost of six telephones installed ($85), makes the total $589.

As a general proposition, two of these telephones will be in the four-mile radius, two in the five mile and two in the six, and they will bring in, according to the rates I have given, $30, $40 and $50, a total of $120. Let us see what our profits will be at the above figures:

Agents' commission, 20 per cent of $120	$24.00
Maintenance per 'phone, including livery hire, labor, etc., at $1.25 each	7.50
Three per cent tax on gross receipts	7.20
Depreciation, 5 per cent of $589	29.25
Total	$67.95

Receipts, $120, less maintenance, $67.95, leaves $52.05 profit on an investment of $589, or about 9 per cent, and when you take into consideration the fact that the farmers' line, if disconnected, cannot be used again for someone else as readily as a city line, the profits are none too large.

Of course, if you have six telephones on one line, each of them six miles out, you can afford to make a smaller rate than when they are distributed as I have shown above, but my experience is that the above distribution is about right.

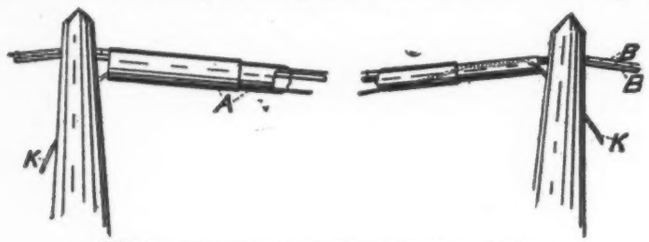
*Paper read by C. E. Tarte before the Michigan Independent Telephone Association, Detroit, March 13.

DIGEST OF TELEPHONE AND KINDRED PATENTS.

CONDUCTED BY EDWARD E. CLEMENT.

688,970.—F. D. Saylor. Fire Protector for Telephone Cables.

This is a telescoping series of split tubes formed of wire gauze, covered with asbestos, and adapted to be sprung over a cable at one pole and pulled out until the whole length

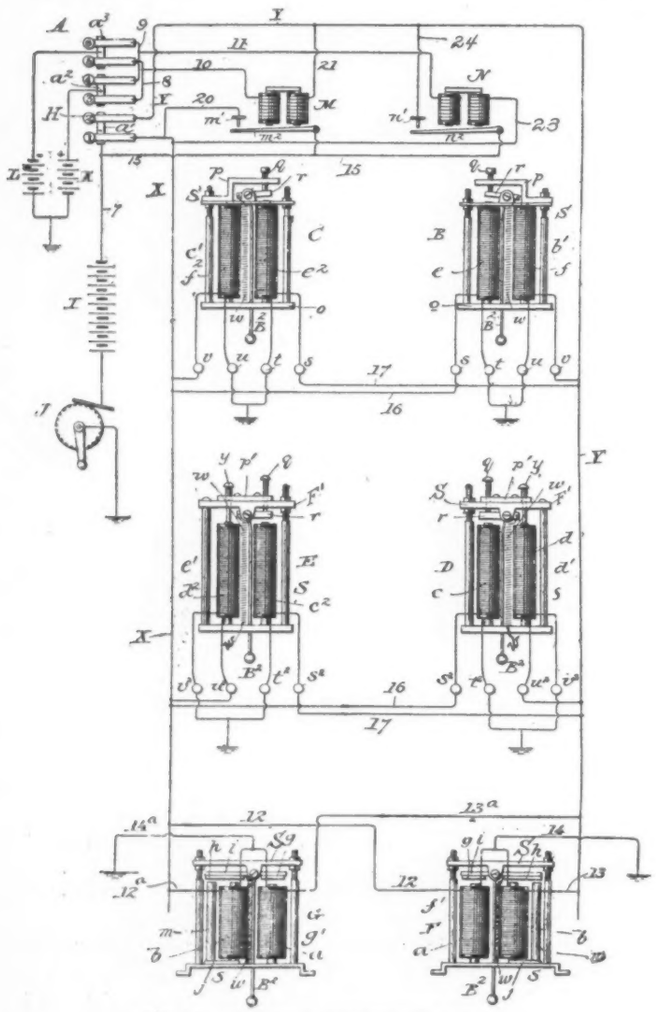


688,970—FIRE PROTECTOR FOR TELEPHONE CABLES.

between poles is covered to protect it from the effects of fire in the neighborhood. An asbestos-covered rope, K K, is used to pull the sections in and out.

689,141.—J. V. Stout. Selective Telephone System.

This is a system for ringing one of a set of bridged bells without having any intermediate apparatus, the se-



689,141—SELECTIVE TELEPHONE SYSTEM.

lective mechanism being parts of the bells themselves. A-B-C-D-E are separate stations. Each ringer has an operating magnet and what may be called a polarizing magnet. At station B, for instance, e is the operating magnet and f a polarizing magnet. To operate this, key 3 is depressed at the central office, sending continuous current from battery K through magnet M to line wire Y, to magnet f and ground. Relay M puts on pulsating current from battery I to wire X, which energizes magnet e intermittently to ring bell at station B. The other bells do not ring with this combination, either because the pulsating and continuous currents do not pass the proper magnet or do not produce the necessary polarities. By pressing the proper key the necessary selection and combination of currents will be sent to each line to affect any desired one of the six bells.

689,387.—W. B. Crossland. Sectional Electric Light, Telephone or Telegraph Pole.

This gentleman is from Oklahoma, and his invention is a transportable pole. The stub or pole proper has a taper at each end, and removable head and foot sections to fit

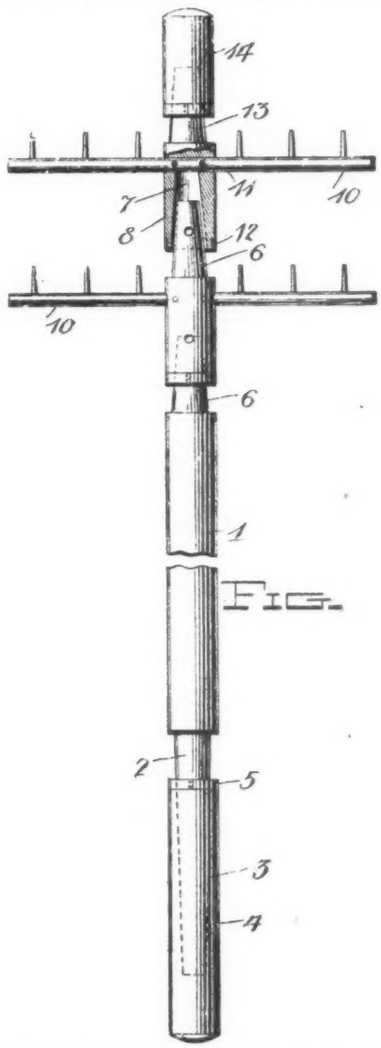


FIG.

689,387—SECTIONAL ELECTRIC LIGHT TELEPHONE AND TELEGRAPH POLE.

the tapers, and secured in place by wood pins. The cross-arms are secured in the removable sections, and the entire pole is a "knock-down" affair. The drawing shows the sections partly fitted together.

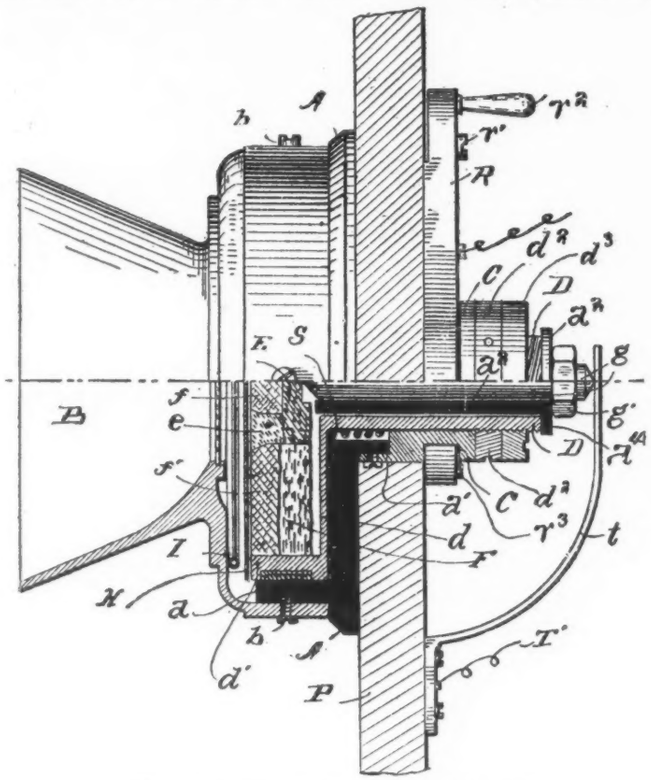
689,503.—A. M. Massari. Electric Telephone Transmitter.

A granular carbon transmitter of a common type, with carbon diaphragm H, rubber ring I, carbon chamber E, granular carbon e, felt pads f and f', chalk filling and insulation F, an annular inset C and a sliding fork R on the back of the mounting, this fork dropping down around the inset to hold the transmitter in place.

689,631.—S. J. Ballard. Telephone Indicator.

The mechanism of the indicator proper in this case is simple and presumably operative if current is supplied, but

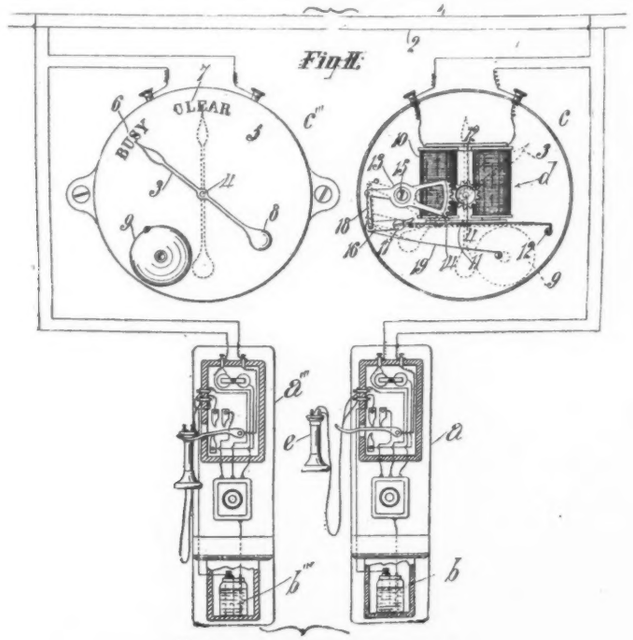
the system upon which it depends is inoperative, and it is a matter for wonderment how the patent office officials can be as lax as this and other recent issues would seem to indicate, not to mention the attorneys. Such patents are



689,503—ELECTRIC TELEPHONE TRANSMITTER.

not only superfluous in themselves, but they tend to weaken confidence in other and better grants, as well as in the administration of the office.

The alleged invention is of an indicator for party lines, consisting of a band, 12, that is thrown around from "Clear"

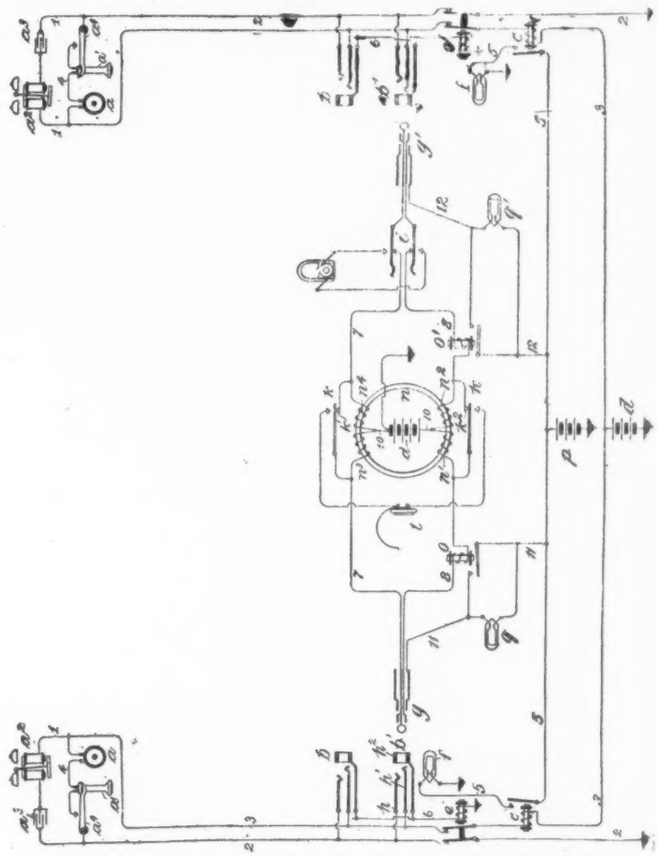


689,631—TELEPHONE INDICATOR.

to "Busy" when current is on the line. The patentee says, with perfect confidence, that "the current that flows in the line wires whenever any of the receivers is off the hook, is sufficient to work all the indicators," and then shows bridged 'phones with local batteries. It is difficult to see how even a common battery supply could be manipulated from any one point to achieve this end. As for the indicator itself, it is of a particularly old and well-known type.

689,903.—J. L. McQuarrie. Testing Appliance for Multiple Switchboard.

This is a slender invention elaborately described. It relates to the ordinary form of common battery "relay board" used by the Bell company, and refers particularly to



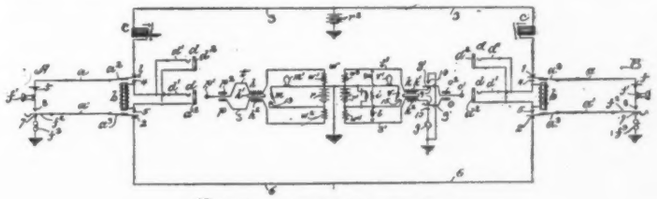
689,903—TESTING APPLIANCE FOR MULTIPLE SWITCHBOARD.

back contacts k^1 k^2 on the listening key, which break the direct connection between the tips of the answering and the calling plugs when the operator tests, so as to prevent false signals.

689,953.—F. W. Dunbar. Telephone System.

This is the quite well-known "cut-on" circuit used by the Kellogg company in common battery system.

In the figure, A and B are subscribers' stations, with the usual apparatus, and C-C are line signals at central. Each line is normally connected through back contacts 1-2



689,953—TELEPHONE SYSTEM.

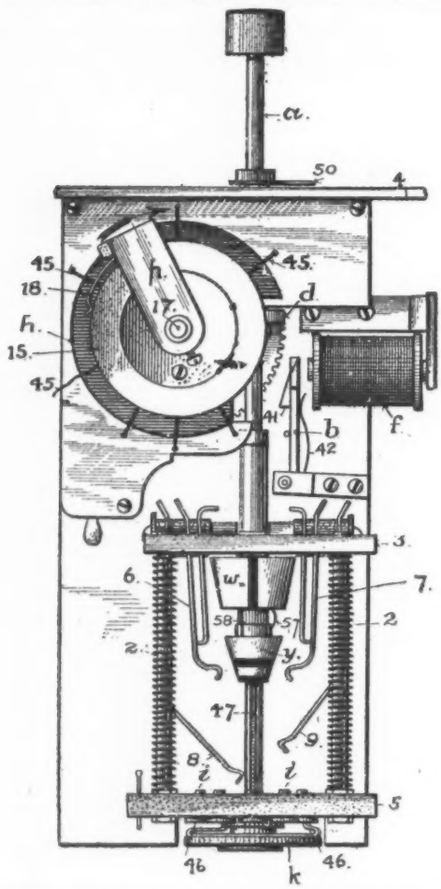
and armatures a^2-a^3 with its line signal and the main battery, and each line is normally entirely disconnected from any of its spring jacks.

When a signal is set, or connection is desired with any line, a plug is inserted in the corresponding jack. At once bridged battery is applied to the relay C, bridged across the jack terminals, and this relay disconnects its line from the signal circuit and connects it to the jacks, so as to com-

plete a circuit from the subscriber through the cord. Two separate bridged main batteries, r and r', are shown, but a single one may be used in the middle of the repeating coil.

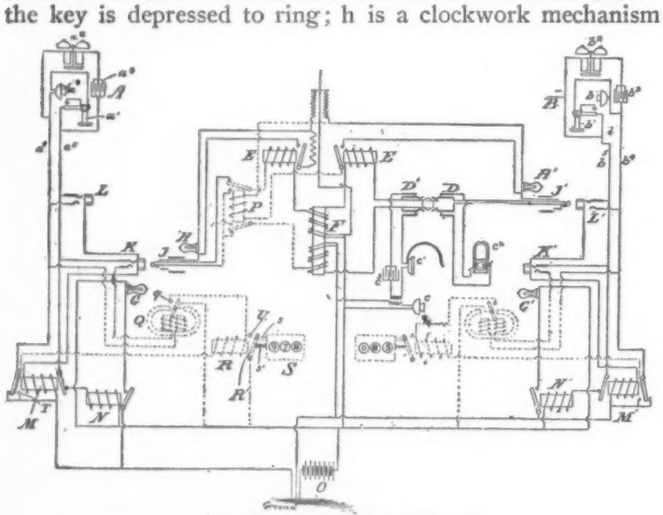
690,127.—F. W. Alston. Time Regulated Ringing Key for Telephone Lines.

This is a selective ringing key for party-line ringing, having a vertically working plunger, *a*, carrying a button



690,127—TIME-REGULATED RINGING KEY FOR TELEPHONE LINES.

at its upper end, and having an indicating hand, 50, spliced on it so as to be turned on the table for selection before the key is depressed to ring; h is a clockwork mechanism



690,289—TELEPHONE METER.

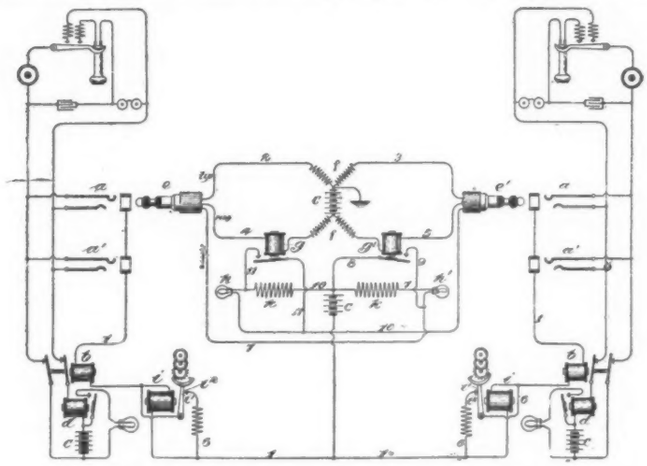
requiring to be wound and adapted to rotate arm p around over ring 15 and segments 45, insulated therefrom, thereby bridging generator across them in regular sequence. At the bottom of the key is a selective switch, k, with contacts, 46, corresponding to and connected with the segments, 45. A spring turns over these, carried on the end of the plunger, *a*, and when the plunger is down a circuit is complete from this spring through plunger to the tripping magnet, f.

On the plunger are mounted cones *w* and *y*, the latter having annular sections making contact with springs 8 and 9 however rotated, the former reversing their connection with springs 6 and 7 when rotated, thereby reversing generator connection to segments, 45. The division is marked by red and black figures on the top of the keyboard.

To select a station, key a is first turned until pointer 50 is over the proper red or black figure, then depressed. Collar d latches on hook b, and the button stays down. In descending it has wound up the spring of clockwork h and released arm p, which commences to revolve, and thereby connect and disconnect generator to line with regularity. When the segment is reached corresponding to the contact 46 on the bottom of key, current passes through magnet f and the plunger is tripped and arm p again locked.

690,289.—H. A. Holdrege. Telephone Meter.

This is a call register or meter, adapted to work in conjunction with a common battery system of the type now in



690,453—SERVICE METER FOR TELEPHONE LINES.

use by the American (Bell) company. Calls are registered only when a connection is complete—that is, when the called subscriber answers.

In the figure, A and B are two subscribers' stations, and A calls. The line relay, N, closes circuit of lamp, G, in the usual way, and operator responds by inserting plug, J. This closes circuit from the battery, O, through the sleeve of the plug to the cut-off relay, M, which cuts off the line relay and battery connections, and incidentally closes the register circuit at T. This circuit is also controlled by a polarized relay, Q, included in the line behind the jack. When the plug is inserted current flows to line, but is of wrong polarity to affect the relay Q. A pole changing relay, P, is connected across the circuit of the supervisory lamp corresponding to each calling plug, J', however, so that when the called subscriber answers the lamp is shunted and relay, P, is energized to reverse the direction of current through relay, Q, which thereupon closes circuit of the magnet R, which actuates the register, or rather pulls back lever, R', and pawls, so that when the plug, J, is finally removed from the jack, K, the release of all the parts will register. After the register magnet, R, has once pulled up its armature the latter will stay up by reason of closing a short circuit on itself at U. Subsequent actions of the subscribers do not affect it.

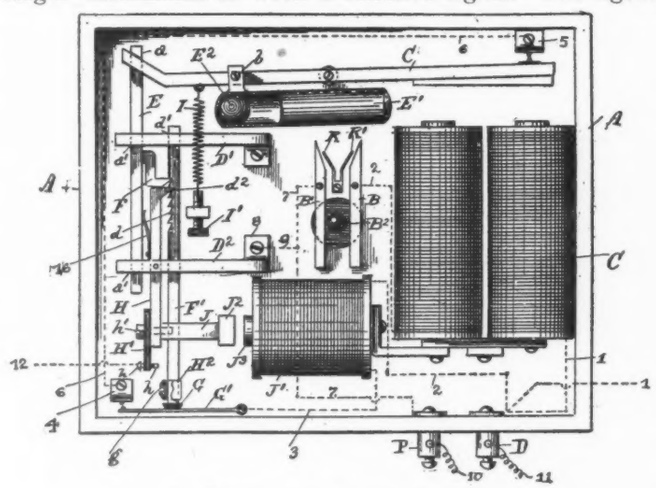
690,453.—F. R. McBerty. Service Meter for Telephone Lines.

This is another register device of a somewhat similar nature to that just described. Each line has a register i, and each register is controlled during a connection by the opposite party's supervisory relay. In the diagram the left-hand subscriber calls and plug e is used to answer. The

connection is completed with plug e' to line on the right, and supervisory relay g' responds to the movement of the called subscriber. The register magnet i of the calling line is included in the circuit l with the cut-off relay d completed when plug e is inserted. The register magnet is normally short-circuited by its own armature, and the current flow permitted by resistance k in the supervisory lamp circuit is not sufficient to energize the magnet with this shunt around it. When the called subscriber answers, however, not only the lamp h' but the resistance k is short-circuited, with the result that current passes more than sufficient to pull up armature i', and once the latter is up it stays up, as even the small flow resulting from the breaking of the lamp shunt when the subscriber hangs up is enough to make an armature stick up.

690,651.—H. I. Hauxhurst. Telephone Attachment.

This is a substitute for the ordinary ringer, or, rather, an attachment that will supersede the gongs and use the ringer mechanism to work a selective signal. The figure



690,651—TELEPHONE ATTACHMENT.

shows a box adapted to be fitted on the front of a magneto bell box, the clapper rod of the magneto ringer coming into the box as shown at B^2, and lying between two pivoted levers, B and B', which are thrown back and forth to make contact with terminals KK' when the ringer clapper moves. Suppose the call to be for station 3, with three rings as the agreed signal. In the present device the clapper vibrates three separate and distinct periods, during each of which the magnets C are energized through the closure of their circuit at KK', and the lever C' is tilted to lift the hanging bar E, which, by means of the dog F, lifts the bar F' one step for each ring, the ball E^2 on lever C' being to prevent the latter from going all the way back between the strokes. When the bar F' has been lifted three steps the point g is in contact with point h to close the local battery circuit to the battery bell that rings the alarm. It will thus be understood that instead of having every ringer on the line respond to every signal, the clappers respond to set the circuit closers h g, and thereby ring the signal at the proper selected station only.

CANADIAN TELEPHONY.

The Dominion government bill recently brought forward regulating telephones and telegraphs provides that the lines shall be so constructed as not to interfere with the public use of roads and highways or impede free access to any building. Tolls may be fixed for either the whole or any particular part of the company's line, but such tolls are to be uniform to all persons, and are to be approved by the governor in council. No company is to make any secret rebate to any customer. After two months' notice the government may assume possession of the property of any company, and, in the event of a difference as to compensation, reference is to be made to three arbitrators. A clause makes it compulsory upon a telephone company to supply telephone connection to any applicant upon the payment of lawful tolls.

PAUL W. BOSSART.

The subject of this sketch, Mr. Paul W. Bossart, was one of a number of expert telegraphers selected by the managers of the American Bell Telephone Company early in telephone history to do the pioneer work incidental to introducing the telephone in a practical way for commercial and social purposes; his first assignment was to install an exchange in Kansas City, Mo., in 1879, which was followed by exchanges in St. Joseph, Mo., Atchison and Leavenworth, Kan., then the larger towns in Kansas, all of which were successfully constructed and operated under his supervision and management until 1884, when he was transferred to eastern territory, with similar duties on a larger scale. In 1885 a flattering offer from Prof. Edison to enter his service

PAUL W. BOSSART.

induced him to leave the telephone field, which he reentered shortly after the expiration of the fundamental Bell patents, again taking up pioneer work in connection with the Independent telephone movement, his previous training and experience in the telephone business and other branches of electrical work, closely allied therewith, peculiarly fitted him to enter this line of work with advantage to his employers. His first connection with the telephone manufacturing interests was with the American Electric Telephone Company, with which company he remained about four years, holding the title of assistant general manager, and materially assisting in building up the business of that company. He subsequently accepted a position with the Kellogg Switchboard & Supply Company, with which company he is at present engaged as manager of the eastern district, with headquarters at 204 Keystone Telephone building, Philadelphia, Pa.

THE NEW STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY.

The Stromberg-Carlson Telephone Manufacturing Company has been incorporated at Rochester, N. Y., with a capital stock of $3,000,000. Large interests in the company have been purchased by prominent capitalists in Rochester and Chicago, all of whom are prominently identified with the Independent movement. It is understood that the reorganization will guarantee for the Stromberg-Carlson Company the benefit of larger capital with which to

ALFRED STROMBERG.

extend its already very large business. The present factory at Chicago is to be very greatly enlarged and it is probable that auxiliary factories will shortly be erected in Rochester and elsewhere.

The phenomenal growth of the Stromberg-Carlson Company is an illustration of the possibilities of the Independent movement. Beginning in a modest way in 1895, and with only a very small number of employes in its factory, the company has had a steady and consistent growth ever since. In later years it has attained a position of great prominence among Independent manufacturers, and has enjoyed a large and profitable business.

To Messrs. Alfred Stromberg and Androv Carlson, whose names are so prominently linked with the company's affairs, is due much of the honor which comes with the success of the company. Many other men connected in the past or at the present time with the Stromberg-Carlson Company have materially assisted in the upbuilding of the present business.

* * *

TELEPHONY is in receipt of the following letter from a director in the new Stromberg-Carlson Telephone Manufacturing Company:

Rochester, N. Y., April 2, 1902.

TELEPHONY, Manhattan Building, Chicago, Ill.

Dear Sirs:—In reply to the inquiry of your president as to the Stromberg-Carlson transfer of interests, and the work which it is contemplated doing in Rochester, I beg to say:

A considerable number of Rochester men have become interested in the Stromberg-Carlson Company, and a corporation has been organized under the laws of the state of New York to take over the entire assets of the concern. This has been done mainly for four reasons:

1. To incorporate under laws more favorable to manufacturing corporations in some particulars than those of Illinois.

2. To provide ample capital for the present and future requirements of the business.

3. To organize the corporation on the most approved modern lines, and in accordance with its present size and importance.

4. To make certain by a voting trust (now authorized by statute in this state) that this company shall *never* fall into hands adverse to the Independent telephone interests of this country.

The directors of the reorganized corporation will be Messrs. Alfred Stromberg, Androv Carlson and Charles A. Brown of Chicago, and Frederick Cook, president of the Rochester Gas & Electric Company; Thomas W. Finucane, director of the Alliance Bank and of the Security Trust Company; Charles E. Angle, treasurer Mosely & Motley Milling Company; Walter B. Duffy, president New York & Kentucky Company; John C. Woodbury, president Woodbury Whip Company, and Eugene H. Satterlee, vice-president German-American Bank, all of Rochester. Among the incorporators are Hiram W. Sibley, capitalist; Rufus A.

ANDROV CARLSON.

Sibley, president Sibley, Lindsay & Curr Company; James S. Watson, capitalist; William C. Barry, of Ellwanger & Barry Company, nurserymen; James G. Cutler, president of the Cutler Manufacturing Company; George W. Ham, treasurer C. T. Ham Manufacturing Company; Carl F. Lomb, secretary Bausch & Lomb Optical Company; Frederic P. Allen, cashier German-American Bank; Albert C. Fenn, vice-president Alliance Bank; John Craig Powers, secretary Fidelity Trust Company, and E. Frank Brewster, vice-president Flour City National Bank. Among the other stockholders are George Eastman, treasurer Eastman Kodak Company; Edward W. Peck, secretary and treasurer Co-operative

Foundry Company; Albrecht Vogt, president Vogt Manufacturing & Coach Lace Company; V. Moreau Smith, secretary Rochester Trust & Safe Deposit Company; George Wilder, vice-president Central Bank; Thomas J. Devine, of Burke, Fitz Simons, Hone & Co.; David M. Gordon, of Brewster, Gordon & Co.; John N. Beckley. president Toronto, Hamilton & Buffalo Railway; Frank Taylor, president Union Trust Company, and C. S. Abbott of the General Aristo Company.

The continuance of Messrs. Stromberg and Carlson in their present positions is assured. They will be largely interested in the reorganized concern as stockholders and otherwise. Charles A. Brown, Esq., of Chicago, who has acted in patent matters for the company, will continue his present relation to the concern. Chicago will be the manufacturing headquarters of the company in the future, as in the past, but with greatly enlarged facilities for the prompt handling of the business. It is possible that some part of the work incidental to the manufacture of telephones and switchboards will be carried on in Rochester. This matter is receiving careful attention, but as yet without definite results.

Trusting that this information will be what you desire, I am, Very truly yours,

EUGENE H. SATTERLEE.

* * *

The Stromberg-Carlson Telephone Manufacturing Company is widely known to the trade in the manufacture of both telephones and switchboards, having a very large and high-grade factory equipment, and giving employment to a large force of men. It has made installations of its apparatus in all parts of the United States and is recognized as one of the leaders among Independent telephone manufacturers.

DEATH OF WILLIAM LOHMILLER.

A kindly, honest, vigorous life was ended when death claimed William Lohmiller at his home in La Crosse, Wis., on March 9. In the prime of his years, and in the midst of

WILLIAM LOHMILLER.

his most vigorous activities he was stricken. While in attendance at the recent convention of the Wisconsin Independent Telephone Association at Milwaukee he contracted a severe cold, which later, developing into pneumonia, caused his death. Mr. Lohmiller was one of the Wisconsin pioneers in Independent telephony. In 1895 he organized the La Crosse Telephone Company, and by his hard and untiring work made it a conspicuous success. He was prominent also in the toll line business of Wisconsin, and was an officer and stockholder in various Independent telephone enterprises.

Independent telephony in Wisconsin has lost one of its strongest champions, whose most fitting monument is the prosperous company of which he was the father. TELEPHONY, together with Independents everywhere, shares in the grief at the untimely end of a man both admirable in his business life and lovable as a friend.

COLONEL AYRES J. TAYLOR.

Colonel Ayres J. Taylor of Vincennes, Ind., is interested in the development of Independent telephone properties. In Vincennes, where a very bitter fight was made by the Bell company to prevent the granting of a franchise to

AYRES J. TAYLOR.

the Independents, Colonel Taylor was an earnest worker for the Independent people. He is a member of the city council and prominent in state politics.

HOW IT IS DONE IN CHICAGO.

"Number?" asked "Central."

"South 114, please—and—I'm in a rush."

"Hello, Adrienne; this is Ernest. You knew my voice, did you? Say, Adrienne, come downtown and get married—hurry up!"

"Get your number?" put in Central.

"Bet your life," declared Ernest G. Dann of the Dann school supply house, hanging up the receiver.

Then Ernest sat down in the parlors of the Great Northern Hotel and waited for the coming of his bride. His bride was Adrienne Sincere, daughter of Dr. Emil Sincere, 4129 Michigan avenue. She was there within an hour.

Justice of the Peace Murphy and S. Kichner, an intimate friend of the prospective groom, were summoned to the office of Attorney Turner in a downtown building, and there the marriage took place. The license had been procured earlier in the day at about the time Mr. Dann made up his mind he couldn't wait any longer. Arrangements had been made for the marriage of Miss Sincere and Mr. Dann at the residence of the bride's parents a fortnight hence. But those two weeks looked so long to the couple that it was determined to dispense with them.

The father of Miss Sincere was informed of his daughter's marriage during the evening and hastened to offer his congratulations.

Telephony.

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CHICAGO, APRIL, 1902.

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WELCOME TO THE INTERSTATE INDEPENDENT TELEPHONE ASSOCIATION.

Chicago, the center of the Independent telephone movement of the United States, stretches out her hand in cordial welcome to the delegates and visitors at the first meeting of the Interstate Independent Telephone Association. The latchstring of hospitality is out at every Independent factory and every Independent heart thrills with the warmth of greeting.

Independents of the great Central West, Independent Chicago bids you welcome, twice welcome and welcome again. We have known and participated in your early struggles. Our eyes have widened with growing pride at your progress. Ours has been the proud privilege of cheering your success. During the years of the upbuilding of our Independent factories and supply houses your hands have sustained us, your confidence has strengthened ours, your energies have fired our ambitions to greater effort. To-day we greet you at our hearthstone and ask no greater privilege than that of making you welcome.

We send our brightest and our best to meet you and extend our invitation to visit and inspect our factories and display rooms. We have no other business while you are with us than that of making you feel at home among us. We have no other wish than that you will be glad to visit us again.

Independents all over the United States have much in common with each other, but nowhere are the ties more closely knit than those which bind Illinois and her neighbor states together. We are comrades, veterans of the grand army of Independent rebellion against the tyranny of the Bell monopoly. The badge of our independence we proudly wear, in token of our comradeship in arms, and round our campfires at our convention we will tell again the stories of the war and our experiences in camp and on the battlefield.

And comrades, as the years pass by and those who were the pioneers shall have become the veterans of Independent telephony; when we shall lay down the burdens of the day, and in the cool evening grow reminiscent of the past, may our present meeting in Chicago, for the formation of the Interstate Independent Telephone Association, be a bright spot in our lives, and a time long to be remembered as a reunion of soldiers in a mighty conflict of men and brains and money.

Independent telephony, with the impetus which it now has, is destined to be a potent factor in the future of the world. It is no mean calling, and we may be pardoned if as we gather in convention our heads are high, our eyes are bright and there is in our cheeks the warm color of victory achieved.

And again we of Chicago say to the Independents who are our guests:

Welcome.

SIGNS OF THE TIMES.

It is not many years since Independent telephone manufacturers rested content when they could produce apparatus equal to that used by the Bell Telephone Company. To be "as good as the Bell" was deemed a sufficient excellence. Those were the days when Independent telephony was timorous of its own unknown strength. As the Independent movement grew and the field of vision widened, the engineer set for himself a higher mark; henceforth he must produce a telephone "better than the Bell." This work seemed destined to require years, but quickly as the first object was accomplished there can be no comparison with the astounding rapidity which marked the realization of the second, and to-day Independent telephony, which only a few years ago stood aghast at its own daring, and bolstered up its hopes with wild dreams of some day equaling the Bell, has overhauled and passed the clumsy hulk, whose sails no longer catch the wind, and proudly, with colors flying and every stitch of canvas drawing, the good ship "Independence" will soon leave the water-logged "Monopoly" far behind. And when successively the hull and spars of her old competitor sink beyond the horizon in the West, what mark shall the new champion set as the limit of her race? There can be no boundary, no end to her progress. She will sail on and on, kissed by the soft lapping waves of calm, and steadily, forward through storm, until the golden light of the rising sun on the eastern waters shall gild her sails of perfection.

There is that in Independent telephony which brings a proud flash to the eye, a tightening of the lips and quickness to the feet; there is that, too, which brings a lump into the throat, and the voice grows husky when the tale of success is told. No business movement of any time partook so largely of true patriotism. No rivalry for wealth has ever witnessed such harmony of feeling and of action; no struggle has ever been so crowned with success.

It may be wrong for Independents to recognize no limits to their ambitions, but in the light of past and present progress there is no goal which may be set that will not soon be passed. Limitless as is the usefulness of the telephone, even more limitless are its possibilities. We cannot be far wrong in saying that coming perfection is one of the "signs of the times."

PROGRESS OF AN INDEPENDENT COMPANY.

The crystallization of the plans of the Frontier Telephone Company, which is to install a new telephone system in Buffalo, N. Y., in opposition to the Bell Telephone Company, is practically accomplished. Although there are still a few necessary details to be finished before everything is completed, there is but little doubt that the company will begin the work of laying conduits in the streets about April 1. According to the restrictions in the franchise granted the company by the city, it is compulsory on the part of the company to file with the city authorities a detailed plan of its work. The company has until May 1 to prepare its plans, but the work has progressed with such rapidity and the officials have been so attentive to their respective duties, that the plans will shortly be submitted to the city. W. H. Johnston, superintendent of the company, recently said:

"We want to make a system that is as up-to-date as possible. This means keeping wires off the streets as much as we can. In the downtown business blocks we want to run cables into the basements to terminal heads, so that the wires will run directly from the heads to the instruments in the buildings, and thus they won't be affected by sleet, snow or high winds, which would damage them if they were in open air."

AESTHETIC TELEPHONY.

Cultured Evanston, Chicago's northern suburb, has placed the seal of its disapproval on the "vulgar" word "hello," so commonly employed by people who use the telephone.

It is no longer good form in Evanston to say "hello." A telephone conversation in that classic city will in future be conducted according to the strictest rules of polite society. The patient English language may not be able to withstand this latest drain upon its strength, and there is grave danger that to be "proper," telephone subscribers will have to resort to the polite idioms of France. We presume the future conversation will be about like this:

"Ting-a-ling-a-ling. Good morning, central, kindly place my telephone in connection with telephone Main 486. ——yes, thank you, that number is correct. —— Good morning, will you please inform me if Mr. Smith, the purveyor of meats and groceries is present in his place of business——indeed, this then is Mr. Smith—Mr. Smith will you please instruct the youthful person of the male sex who drives the horse attached to your delivery wagon, to kindly call at the residence of Mrs. Jones in Lake Front Avenue, to receive instructions regarding the groceries and meats desired by Mrs. Jones for dinner? Thank you, yes, I have concluded my remarks, good morning Mr. Smith. Ting-a-ling-a-ling."

It will take a real American a long time to get cultured up to that sort of thing. He has been used to a—Hulo—gimme Main 4-8-6, —— Hulo—this Smith's?——send a boy to Mrs. Jones', on Lake Front Avenue, for an order. Goodbye.

Meanwhile, if Evanstonians get any comfort out of the practice, let them be as unnatural as they choose. There is one comfort, they can't change the "hello girl" to a "good morning" girl or to anything else but her own charming businesslike self.

MISSOURI RIVER TELEPHONE ASSOCIATION.

The Missouri River Telephone Association, composed of representatives of all the Independent toll lines and exchanges in the Missouri Valley, held its annual meeting in Saint Joseph this month, and elected officers for the ensuing year as follows: H. E. Ralston, Maitland, president; G. A. Haynie, Savannah, vice-president; L. N. Frye, Grant City, secretary and treasurer. Mr. Ralston and Mr. Frye were re-elected, having held their official positions in the association for several terms.

An executive committee, composed of E. H. Berry, Atchison; J. T. Norman, Stanberry, and F. S. Travis, Tarkio, was chosen for the ensuing twelve months.

Besides the discussion of general routine business of interest mutually to the members of the association, the long-distance copper line question received attention. A communication from the Iowa association was read, stating that seven carloads of copper wire are to be strung between Des Moines, Omaha, Burlington, Keokuk and intermediate points. It was announced that a company is being formed to string a copper wire from Saint Joseph to Des Moines, which will be connected with the Iowa lines.

ANOTHER GOOD THING GONE WRONG.

One by one the plums are falling off the tree. One by one the branches are rotting from the parent trunk. Little by little the dry rot is eating in toward the heart. Another good thing has gone wrong.

The Chicago Telephone Company, the stalwart of the stalwarts, the never-failing source of supply whence deficiencies elsewhere have been made up, has fallen from its proud estate. Its dividend has been cut, and there is mourning in the house of the monopoly.

A prudent husbandman, perceiving the unhealthful appearance of his most cherished tree, does not cut it down forthwith. He prunes it and hopes for its recovery. But in his heart he fears that it may not regain its former strength. The board of directors of the Chicago Telephone Company have been wise to prune this tree. They have trimmed away from its too exuberant branches one-sixth of its former annual dividend, and are bending every energy to nurture and protect what there is left. It requires no great stretch of the imagination to foresee the necessity of other prunings by and by.

TELEPHONY wishes no man ill, but cannot help seeing in this sign of weakness a proof of the oft-repeated adage that "sin brings its own punishment." For the innocent stockholders in Bell companies we have but one word of advice—examine, and examine thoroughly, Independent telephone stocks and learn for yourselves if there will be any reduction in dividends upon such stocks. If Chicago Telephone Company stockholders wish to learn the true reason for the reduction in their didivend rate, they can find it by spending half an hour each day, on April 9, 10 and 11, at the Sherman House, Chicago, in attendance at the convention of the Interstate Independent Telephone Association.

MARRIAGE OF G. C. FRICKE.

Mr. G. C. Fricke, the well-known purchasing agent of the Standard Telephone & Electric Company, Madison, Wis., was married Wednesday evening, April 2d, to Miss Edith May Haas. The marriage ceremony took place at the residence of the bride's father and mother, Mr. and Mrs. Rudolf Kenn, Clyde avenue, Morgan Park, Ill., and was largely attended by invited guests. Mr. Fricke and wife will locate in Madison.

POLE LINE SPECIFICATIONS.*

The line poles used in building telephone pole lines shall be of selected straight, live Michigan or Idaho cedar, with butt and top squared, free from stumpage, bark, splinters, dry or wet rot, and with all knots closely trimmed. All poles shall measure at least 22 inches in circumference at the top, and the butt measurements of the respective poles used, taken 6 feet from the lower end of the pole, shall be as follows, if of Idaho cedar:

Poles 25 feet long shall measure 33 inches, 6 feet from butt.
Poles 30 feet long shall measure 35 inches, 6 feet from butt.
Poles 35 feet long shall measure 38 inches, 6 feet from butt.
Poles 40 feet long shall measure 41 inches, 6 feet from butt.
Poles 45 feet long shall measure 45 inches, 6 feet from butt.
Poles 50 feet long shall measure 48 inches, 6 feet from butt.

If Michigan cedar poles are supplied, they shall have been cut from the best quality of live, growing, sound white cedar, with a ring of white sap wood surrounding the heart wood, free from pencil holes in the top that weaken the pole and having butt rot not to exceed 10 per cent of the total area of the butt and extending upward less than 3 feet. These poles shall be squared at both ends, reasonably straight, evenly tapered and well proportioned from butt to top, have all knots trimmed close, measure at least 22 inches in circumference at the top and not less than the stated butt measurement 6 feet from the thick end.

Poles 30 feet long shall measure at least 36 inches in circumference.

Poles 35 feet long shall measure at least 38 inches in circumference.

Poles 40 feet long shall measure at least 43 inches in circumference.

Poles 45 feet long shall measure at least 47 inches in circumference.

Poles 50 feet long shall measure at least 50 inches in circumference.

The quality of cedar poles used for guy stubs and anchor logs shall conform to the requirements for cedar poles. Guy stubs shall be at least 24 inches in circumference at the top, and anchor logs shall be at least 31 inches in circumference and not less than 5 feet long.

The contractor shall secure the poles at the place where they are delivered by the pole dealer and haul same to the respective points along the projected line, indicated by the stakes, placing the butt of the pole close to the stake and in position to cause a minimum of inconvenience to passersby. He shall place the straightest, smoothest and best-looking poles in front of residences and prominent buildings and the heaviest and strongest poles at points where the course deflects from a straight line and at corners where the strain is likely to be excessive.

The contractor shall smoothly chamfer the top of each pole to an angle of 45 degrees, shall shave each pole placed along the main streets of villages, towns or cities, or in front of prominent buildings, and shall gain each pole for four cross-arms. The center of the upper gain shall be 10 inches from the apex of the pole roof, and the distance between the centers of all gains shall be 24 inches. Each gain shall be accurately cut to a depth in the center of the gain of full ½ inch and to a height of 4¼ inches, and be square and true with the axis of the pole and with the other gains; and the contractor shall bore a hole 11-16 inch in diameter through the center of the gain, or gains, of such poles as the inspector may direct. All gains and the top of each line pole and the top of each guy pole shall receive two coats of good white lead paint before poles are erected.

In certain poles, indicated by the inspector, the contractor shall bore holes to the depth of 4 inches, and fit same with galvanized iron pole steps, ⅝ inch in diameter and 9 inches long, placed on each side of the pole at right angles to the cross-arms, and staggered 30 inches on centers on each side of the pole, extending downward from the cross-arms to within 10 feet of the ground. If cedar poles are used having a diameter exceeding 60 inches, then the steps shall be staggered 24 inches on centers on each side. Five wooden bracket steps shall be securely spiked to each stepped pole, three being placed on the front of the pole and two on the back, 36 inches apart. The first step shall be spiked 18 inches above the ground.

Pole holes shall be dug to the following depths in feet:

Length of Pole.	On Straight Lines.	On Curves.
25 feet	5 feet	5½ feet.
30 feet	5 feet	5½ feet.
35 feet	5 feet	5½ feet.
40 feet	6 feet	6½ feet.
45 feet	6½ feet	7 feet.
50 feet	6½ feet	7 feet.

The depth of corner pole holes and wherever there is likely to be severe strains shall be the same as on curves. All pole holes shall be dug sufficiently large to admit the pole without stabbing or hewing, and shall be of full size at the bottom to permit the free use of iron tamping bars. After the pole is placed in position only one shovel shall be used in refilling the hole, and at least three men with tampers shall be employed to pack in this filling continuously until the hole is filled. Soil is then to be piled up above the surface and firmly packed around the pole to a height of at least 18 inches.

Wherever the curbing, grass plats, sidewalks, roadway, fences or any private property is disturbed by the contractor he shall restore same to as good condition as when the work commenced, and shall remove all debris within 24 hours from the time the pole is erected, or the inspector will cause this to be done and charge the cost of same to the contractor, and the amount will be deducted from any amount that may be due the said contractor.

When the soil is found to be soft, boggy or treacherous, or where quicksand is encountered, the contractor shall adopt that method among the following best adapted to the respective situation, but all pole holes shall be dug wider and at least 6 inches deeper than usual: (1) The space between the pole and the side of the hole shall be filled with broken rock, well tamped down, and broken rock shall be piled up about the pole to a height of at least 2 feet. (2) Where quicksand is encountered a barrel shall be driven down and the pole placed within the barrel, the barrel then broken and withdrawn. Small rocks and stones shall then be driven down by tampers in the sand surrounding the pole till no more can be forced downward. Rocks shall then be piled about the pole to a height of at least 2 feet. (3) Wet clay shall be carefully tamped down to fill the entire space between the pole and the side of the hole. (4) A packing of rubble, consisting of one part cement, two parts sand and five parts stone, shall be used, and the hole shall be dug from 6 to 12 inches deeper than holes would be dug on curves for poles of corresponding length, and the pole shall rest on a foundation formed of two planks, 1 inch in thickness and from 24 to 36 inches in length. (5) The pole shall be set in a bed of concrete at least 18 inches in thickness, and a pair of key blocks, 2x10x12 inches, shall be bolted to the pole on alternate side of its base, parallel with the cross-arms, one block being bolted to the pole at a point 12 inches below the surface of the ground, on the same side as the cross-arms are, and the other block shall be bolted to the pole 6 inches above the butt. In all places where very soft ground is encountered, two planks, in size 1x24x33 inches, or larger, shall always be fitted at right angles to each other around the base of the pole about 6 inches above the butt, and securely fastened there, and then the hole shall be filled with the stones or the cement or the rubble packing.

All poles shall be firmly set at a distance from each other of from 100 to 140 feet, as circumstances will permit.

*The above are the standard specifications of the Kansas Long-Distance Telephone & Telegraph Company of Topeka, Kan., and furnished to Telephony through courtesy of this company.

When severe strains are likely to be encountered, or the soil is loose, the distance between poles should not exceed 120 feet, and on large, open areas, where the wind has full sweep, poles should be set within 100 feet of each other, more especially in sections where wet snow and sleet storms prevail in winter.

The poles shall be so placed that the gains in each pole shall be at a true angle to the direction of the line. These gains shall alternately face each other on straight lines, but on curves all the gains shall face toward the center of the curve, while the gains on terminal poles shall face outward and on long lines the gains on the last two poles shall face outward. At road crossings the gains shall be placed on the side of the pole facing the road.

All poles shall be placed perpendicularly in the ground to a depth never less than 5 feet, and all poles shall extend upward from the surface of the sidewalk or ground at least 24 feet. When building the line on the side of a high hill or down into a deep ravine, the contractor shall use poles of different lengths from those specified on the stakes, should occasion cause such change to appear desirable in order to avoid abrupt changes in wire levels. Poles shall not be placed otherwise than perpendicular, and side strains shall be provided against by suitably guying.

In building the line parallel to or near railroad tracks the contractor shall set all poles at a distance from the nearest rail of not less than 12 feet. Before attempting to build the line across a line of railroad tracks the contractor shall secure or see that the necessary permission to cross is secured from the proper railway officials, on an application showing the proposed essential features of construction at that point. And the contractor shall abide by and comply with all the requirements the railway company may incorporate in its permission.

At all railway crossings the contractor shall erect poles of a length sufficient to insure a distance of at least 22 feet between the top of the rails and the lowest point to which the lowest wire used may sag. At all railway crossings the wire circuits shall be dead-ended on each side of the crossing, and a short piece of wire connected into each end of each circuit of sufficient length to cross the space intervening from the pole on one side of the tracks to the pole on the opposite side.

At the crossings of all country roads and village streets the contractor shall use poles that will insure a distance of at least 18 feet between the crown of the road and the lowest point to which the lowest wire on a fifth cross-arm to be used may sag. Within the limits of incorporated cities the contractor shall use poles at all street-crossings that will insure a distance of at least 20 feet between the crown of the roadway and the lowest point to which the lowest wire to be used may sag from a fifth cross-arm.

In crossing the pole line of other electric companies the contractor shall use poles that will insure a distance in the clear of at least 4 feet between the tops of the poles of the line crossed and the bottom of the lowest gain on the poles set to support the crossing wires.

Before attempting to build a line across a bridge the contractor shall be certain that proper permission has been secured from the bridge officials; also, that the fixtures proposed to be used on the bridge are approved and sanctioned by said bridge officials as well as by the telephone company.

All cross-arms used shall be sawed from the perfectly sound, straight, fine, grain-heart wood of selected Washington fir or of white or Norway pine (but not from bull pine, spruce or tamarack), and be free from spirits and worm holes and from all knots and imperfections that will impair their strength, particularly knots between the fourth and fifth holes on each side of the center and near the bolt hole; be free from mechanical defects, as inaccurate boring and shaping, and be kiln-dried and thoroughly seasoned. No arm shall be accepted having a loose or unsound knot, not matter how small that knot may be.

These cross-arms shall be of the pattern known as the standard cross-arm, and the finished size shall be as follows: In height, 4¼ inches; in thickness, 3¼ inches; in length, 10 feet. The two 4¼-inch sides shall be sawed parallel to each other, and be at right angles to the bottom surface of 3¼ inches, while the top surface shall be chamfered to the radius of about 40 inches in diameter throughout the whole length of the cross-arm, except the 10 inches in the center, this 10-inch space being left square to fit the gain in the pole.

Each cross-arm shall be accurately bored for 10 pins, each pin to be 1¼ inches in diameter; the spacing between the two pins nearest the center shall be about 16 inches, between the other pins about 12 inches, and there shall be a space of 4 inches between the last pin on each side of the cross-arm and the end of the cross-arm.

Each cross-arm shall be bored from side to side for one machine bolt, ⅝ inch in diameter, and for two brace bolts, ⅜ inch in diameter, one brace-bolt hole being bored on each side of and 18 inches from the center of the face of the cross-arm.

After the poles are firmly erected, or before the poles are erected, provided the arms are not used in handling or raising the pole, the cross-arms shall be fitted in the gains on the respective poles, and firmly attached thereto by one machine bolt, ⅝ inch in diameter, with a square washer placed beneath the head and nut of each bolt. Each cross-arm shall also be firmly braced to the pole by two galvanized steel cross-arm braces, 26 inches long, 1 inch wide, ¼ inch thick, and bored at one end for a lag-screw, ½ inch in diameter, and at the other end for a carriage bolt, and the distance between the centers of the holes in the braces shall be 24 inches. One end of each pair of these braces shall be firmly bolted to the face of the cross-arm by a carriage bolt passing through the hole previously bored, 15 inches from the center of the face of the cross-arm. There shall be a washer placed under the nut of each carriage bolt, and the dimensions of these bolts shall be ⅜ inch in diameter and 4 inches in length.

The lower ends of these braces shall overlap on and be firmly fastened to the pole by a lag-screw passing through the larger holes bored in these braces and then driven into the pole. The dimensions of these lag-screws shall be ½ inch in diameter and 4 inches long. On corner poles, at road crossings and other places where the line of poles makes an angle of more than 30 degrees, two sets of cross-arm braces shall be fastened to each cross-arm, one set being placed on each side of the pole.

When the inspector believes that unusual strains may develop at certain corners or curves, and shall so order, then the contractor shall fasten the cross-arm to the pole with a U-shaped bolt, ⅝ inch in diameter, extending entirely around the pole and through the cross-arm and bolted with nuts placed over washers on the face of the cross-arm, or double cross-arms shall be used; or an iron cross-arm brace, 5 feet in length, shall be placed in the center of the arm and bent over and bolted to back of pole.

Before being fastened to the pole each cross-arm shall have ten 1¼-inch standard locust pins securely fastened in the respective holes, and held there by sixpenny galvanized steel-wire nails, accurately driven in full length along a center line on the face of the cross-arm. All pins shall be of the best quality of sound, selected split locust, free from knots, sapwood and other imperfections. In dimensions, each pin shall be 8 inches long over all, with a shoulder 1⅝ inches in diameter, 4 inches from the bottom, and having a thread 1 inch in diameter at the top and gradually increasing in diameter to 1¼ inches, extending downward 2⅛ inches.

For guying pole lines the contractor shall use double galvanized steel strand (equal to Roebling's), made of seven wires laid up in a twist with a right-hand lay, and free from all flaws and other defects. The weight, diameter and the

approximate breaking strain in pounds per square inch of this strand shall be as follows:

7 wires. B. W. G., No.	Diameter, Inches.	Lbs. per 100 feet.	Breaking Strain.
10	7-16	36	5.720
11	3/8	29	4.640
12	5-16	21	3.360
13	9-32	16	2.560
14	17-64	12	1.920
15	1/4	10	1.600

This steel guy strand shall be wrapped twice around the pole at the point selected, and the loose end fastened to the main portion of the strand with the aid of one 3-bolt wire clamp. To prevent the double coil of the strand from slipping away from the desired position on the pole, each coil shall be tightly stapled to the pole with from three to six galvanized-steel wire staples, 2⅛ inches long and made of No. 6, B. W. G., wire.

The clamps used on the steel wire guys shall be of the pattern known as the standard three-bolt wire clamp, and be made of the best quality of galvanized steel. Each complete clamp shall measure 6 inches in length, the longitudinal curve of the grooves shall be the same in each half of each clamp and each half clamp shall be smooth, free from casting imperfections, and have three bolt holes 9-16 of an inch in diameter and spaced 1⅞ inches between centers. The three bolts shall each be 2¼ inches in length, with a nut corresponding in size to the head, shall be of the best quality of steel, with a breaking strain of 80,000 pounds per square inch, and all the threads on these bolts shall be carefully recut after galvanizing.

The guy rods or anchor rods used shall be of galvanized steel, 8 feet long and ¾ inch in diameter. One end shall be threaded for a distance of at least 3 inches and be supplied with two nuts accurately threaded and with two 4-inch plate washers. The other end shall be turned over full 6 inches and welded so as to form an eye 3 inches in length and ¾ of an inch in width at the point of greatest diameter.

For guying to rocks, an eye-bolt shall be used, made in four pieces, and all parts shall be well galvanized. The two sides shall be of the best quality of malleable iron, 9½ inches in length over all—that is, 6½ inches in the shank and 3 inches in the head; the head shall be 2 inches in width in the widest part and the shank 1¼ inches in width; the thickness shall be ¾ of an inch at the base and decreasing to ⅜ of an inch at the point 3 inches from the top. The eye shall be 11-16 inch in diameter and the center of the eye shall be 1 inch distant from the top end. The bolt shall be of steel, ⅝ of an inch in diameter, 2¼ inches in length, not including the head, and shall have a breaking strength of not less than 60,000 pounds per square inch. The center bar shall be made of the best quality of commercial rectangular bar wrought iron, shall be 6½ inches in length, 1¼ inches in width and ¾ inch thick. In using this eye-bolt, a flaring hole, 6½ inches deep, 1¼ inches wide and 1½ inches long at the top, and 1¼ inches wide by 2¾ inches long at the bottom, shall be chiseled into the rock selected. The two side pieces of the bolt shall then be placed in position, the center bar driven down and the bolt tightly screwed. If necessary, it may be cemented in the hole. The guy strand is then passed around the bolt and the loose end of the strand is clamped to the guy with a three-bolt clamp.

In tree-guying no poles shall be guyed to trees until the written consent of the owner is first obtained. When the owner consents, the trunk of the tree selected as suitable for attaching a guy to shall be protected from unnecessary injury by placing beneath the two coils of guy strand strips of hardwood, each strip not less than 1 inch thick and 12 inches long, nor more than 2 inches in width. There shall be no guying to dead trees, nor to the dead limbs of live trees. Rarely will guying to live limbs be sanctioned, and then only where the limb has a diameter exceeding 5 inches. In guying to limbs, the guy strand shall be fastened as close as possible to the point of juncture of limb and tree.

Guying to buildings, or to fence posts, is positively prohibited, and shall not be done under any circumstances. Neither shall guying to bridges or other public or private structures be permitted.

As nearly as possible the following general suggestions shall be followed in the guying of all pole lines. On straight lines carrying one cross-arm, a head-guy and a side-guy shall be placed once in each mile. On lines carrying two cross-arms and more than ten wires, double head-guys and double side-guys shall be placed at least once in every mile. On lines carrying three cross-arms and more than twenty wires, double head-guys and double side-guys shall be placed every half mile. On lines carrying four cross-arms and more than thirty wires, double head-guys and double side-guys shall be placed every quarter of a mile, and additional side-guys shall be used wherever deemed necessary.

All poles having a side strain shall be guyed against that strain wherever possible. The pole at the beginning of each curve shall be head-guyed and side-guyed, and also such poles on the curve as may be deemed necessary; double guys shall be placed where the strain is excessive. The side-guys shall be so placed as to take the strain directly away from the center, while the head-guys shall be placed so as to take the whole strain of the line. Where the line is built on a rising grade, head-guys shall be placed so as to take up the downward strain due to the weight of the line, the head-guy passing from just below the second gain on the lower pole to the base of the next pole on higher ground. In very hilly sections double guying shall be adopted where necessary. Terminal poles on all long spans shall be head-guyed in both directions. An additional pole shall be set within 75 feet of such terminal pole, and head-guyed to the terminal pole, if necessary.

As the lines are usually carried above road crossings at an angle of about 45 degrees, the pole placed on each side of the crossing shall be head-guyed and side-guyed. If side-guys cannot be conveniently located, then additional head-guys shall be placed. If the span at the crossing is a long one, an additional pole shall be set in line on each side of the crossing and head-guyed to the turning pole.

The Y form of guy shall be adopted on all straight lines wherever three or more cross-arms are used, and on all curves, corners and on terminal poles. One end of the steel guy strand shall be wrapped twice around the pole just above the top cross-arm, and be stapled and clamped, while the other end is drawn through the eye of the anchor rod and tightly clamped. One end of a second length of guy strand is then wrapped twice around the pole just below the lower cross-arm, stapled and clamped, and the other end is intertwined with and clamped to the main guy strand. When only one cross-arm is used, the guy shall be attached under the second gain; with two cross-arms, above the second gain.

When pole braces are used the braces shall be fastened to the pole at a point just below the lowest gain, and held to the pole by two tenpenny nails and by five wraps of No. 6 galvanized iron wire.

The contractor shall so place the guys required on straight lines that should the vertical stress exerted on one pole, due to the direct load resulting from an excessive accumulation of sleet or snow, result in crushing the pole, or an excessive lateral stress, due to a gale of wind swaying the wires, snap a pole, then only the section of circuits for a distance of one or two poles on each side of the broken pole shall be affected, and that the remaining poles shall be able to withstand the stresses entailed in carrying the increased load. At all changes in the direction of a line, and where there are corner poles and where there are terminal poles, the contractor shall not only provide an ample factor of safety as outlined above, but shall carefully observe that

the poles selected and located at these points are of sufficient strength and are so suitably braced or guyed as to withstand under all ordinary conditions the bending stress due to the tendency of the line wires or cables to pull the pole sidewise; also to the bending movement likely to arise and due to the sum of all tensions exerted by all wire or cable circuits, and which tend to pull the pole over in the direction of the line.

All wire used shall be equal in conductivity and tensile strength to Roebling's best hard-drawn copper telephone wire and shall conform to the standard specifications in all respects. The wire in each coil shall be drawn in one continuous length, be free from factory joints, scales, inequalities, flaws, splints and all other imperfections, and so protected by wrappings of burlap that the surface of the wire will not be injured or mechanically bruised prior to being uncoiled. For all circuits, hard-drawn copper wire of No. 10 B. & S. gauge shall be used.

In stringing circuits the line wire shall be placed in the groove of the insulators assigned to that circuit and be tied thereto by a soft-drawn copper tie wire 19 inches in length. In tying the line wire the tie wire shall be looped around the groove in the insulator and one end of the tie wire then passed under and over the line wire, while the other end is passed over and under the line wire, each end being given five tightly drawn twists.

At every point where the line changes direction the line wire shall be bent in the groove of the insulator to such an angle as will insure its remaining in the groove, and further insure that the strain shall be evenly distributed. Wherever the line ends dead, a one-half sleeve shall be used to fasten the dead end to the wire, giving the sleeve one and one-half turns after the dead end is slipped in and leaving 2 inches opening between pole and sleeve.

All wires shall be so strung as to allow for the normal expansion and contraction likely to occur under severe and sudden atmospheric changes, in accordance with the standard allowance for length of spans, and the following table showing sag expressed in inches:

AMOUNT OF SAG IN SPANS.

Temperature, in Degrees Fahrenheit.	Spans in Feet.					
	75	100	115	130	150	200
	Sag, in inches					
30	1	2	2⅛	3⅜	4⅛	8
10	1¼	2¼	3	3¾	5	9
10	1⅜	2⅝	3⅛	4⅜	5⅜	10¼
30	1¾	3	4	5⅛	6¾	12
60	2½	4¼	5⅛	7	9	15⅝
80	3⅛	5⅜	7	8⅝	11¼	18¾
100	4¼	7	9	11	14	22¼

On lines built parallel to street railway lines and in noisy sections of the country, the contractor shall transpose the wires at distances of every 1,000 feet, or at less distances should circumstances render such action necessary. Where there is but slight likelihood of disturbances, the wires shall be transposed every 2,000 feet or 3,000 feet, depending on the character of the disturbing cause. The contractor shall follow the standard method of transposition and have each wire or side of each circuit equally spaced between and equally distant from the cause.

Where these lines cross private property, or are built along country roads on which neither electric light nor street railway poles have been erected, there shall be attached to each tenth pole, before the pole is erected, a lightning rod, made of No. 6 galvanized iron wire. This wire shall extend from the top of the pole to the butt and then be coiled twice around the bottom of the pole, and it shall be fastened to the pole with 2-inch galvanized steel staples driven 2 feet apart.

In securing the right of way the owner of private property grants the right to the telephone company to clear away all brush and cut down all trees close to the ground, so as to leave a clear space 20 feet in width—that is, for 10 feet on each side of the center of the indicated course of the pole line. This often necessitates the chopping off of overhanging branches on trees that are not standing within the prescribed 20 feet, in order that these branches shall not sway against the outer wires. Should the owner seriously object to all the trimming outlined, then the contractor shall trim the overhanging branches on each side of the right of way space, in accordance with the requirements and instructions of the inspector given in each case.

Within 48 hours after cutting same, the contractor shall remove all brush, trees, trimmings and debris of every character to such point on the property as the owner may direct, or, if the owner prefers, the contractor shall pile and burn all the cuttings at convenient points along the right of way. If the owner is indifferent to the disposition made of these cuttings, then the contractor shall remove same to the nearest point where they will in no way interfere with the subsequent erection of the poles or the stringing of the wires. The contractor alone shall be responsible for all damages resulting directly or indirectly from the cutting of brush or trees, the falling of trees, the burning of same, or removal or depositing of same, and the contractor alone shall be responsible for any and all damages of claims for damages arising from or through any action of his employes.

FISHER CABLE TESTING SETS.

The managers of telephone exchanges are appreciating more and more how necessary it is to use accurate, quick-acting apparatus for testing insulation, capacity and resistance of underground or overhead cables and for locating faults in cables as well as ordinary wires. Mr. Henry W. Fisher of the Standard Underground Cable Company, Pittsburg, has had an unusual amount of experience in manufacturing and testing cables for all purposes, and as a result of this experience he has designed two types of testing

FISHER PORTABLE CABLE TESTING SET.

outfits, which are placed on the market by Morris E. Leeds & Co., under exclusive license from Mr. Fisher.

The illustration shows a Fisher portable cable testing set, which possesses features of sufficient merit to justify special mention. The set is conveniently arranged and makes it possible to work rapidly, even under trying conditions. The component parts of the apparatus are a dead-beat D'Arsonval galvanometer, mica condenser, resistance of 100,000 ohms, bridge, rheostat, galvanometer, shunt, keys and posts for connections.

The Wheatstone bridge is a decided variation from the usual form, and is based on the Kelvin-Varley slide principle, which makes it possible to locate faults very rapidly.

These Fisher sets have proved extremely popular and are used not only in the United States but in Canada, Mexico and Japan. Recently the U. S. government ordered six Fisher sets, while such concerns as the Standard Underground Cable Company, Safety Insulated Wire & Cable Company and Reserve Construction Company have ordered two or more. To get an idea of the usefulness of the Fisher portable set, it will be interesting to note the following statement by an engineer who has used it under varied conditions:

"In reply to your valued letter of the 29th ultimo, I beg to say that we have used the No. 2 Fisher set almost exclusively for locating faults in cables during the process of manufacture.

"The lengths in these cables run from a few hundred feet to several thousand feet, and the faults are located by an ordinary boy who knows practically nothing about electrical engineering. He makes the measurements and calculates the distance and seldom, if ever, is more than a few feet from the fault.

"We have used the set once for locating a difficult case of trouble for the Pittsburg & Allegheny Telephone Company. They had tried to locate the fault with a Wheatstone bridge and were not successful, but with the No. 2 set we rapidly made insulation tests and determined the good and bad wires, after which the fault was located accurately in a very short time.

"This set has turned out almost exactly as I thought it would, and one of the great pleasures in using it is the fact that you can make measurements very rapidly and can make such a variety of tests that it is very useful in connection with all kinds of cable work. The new method of locating broken wires gives excellent results."

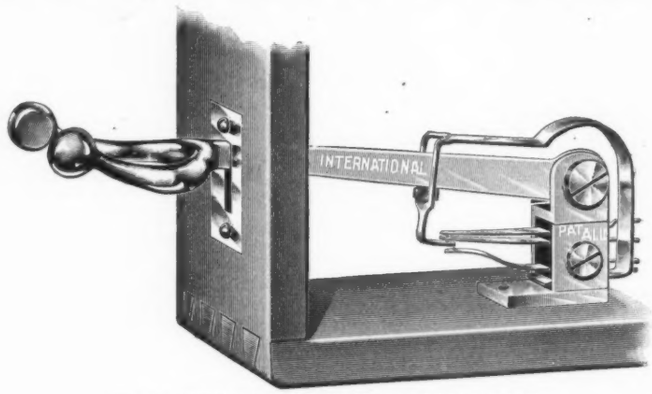
The above apparatus, as well as other cable testing instruments, is fully described in special catalogue No. 360, a copy of which should be secured by every telephone engineer who has occasion to use testing instruments in his work.

Mr. James G. Biddle, 102 Stephen Girard building, Philadelphia, is sole selling agent for Morris E. Leeds & Co., and in that capacity controls the sale of Fisher cable testing sets. Consequently all inquiries for catalogues or other information should be addressed to Mr. Biddle.

A NEW SELF-CONTAINED TELEPHONE SWITCH HOOK.

While one of the most important parts of a telephone is the switch hook, many devices have been evolved by the Bell company, and also the numerous Independent manufacturers, with a view of securing an automatic restoring gravity hook that would form sliding contacts, be positive in its connection, and one whose restoring spring would be of such construction to make it as active and durable as possible. One of the most scientifically designed and durably constructed hooks that has been evolved is the one embodied in the full line of central energy and generator call wall telephones, being put on the market by the International Telephone Manufacturing Company, Chicago.

This hook, shown in the accompany cut, is said to be the first one known that is self-contained, and having no sliding or scraping parts except at the contact points. The base is of cast brass and forms the brace for the hook, the holder for the contact spring block and the shoe for fastening the switch. The contact spring block is of hard rubber, and is slotted to receive the springs. A brass plate, insulated with sheet mica, securely fastened by a heavy binding screw, firmly clamps the springs. The main spring is extended back and over the base of the switch to the proper distance in front of the contact springs; then down, and back to the points of the contact springs. The switch hook passes through an opening in the main spring, to which it is fastened with a rubber stud, perfectly insulating the hook and the base from any part that forms a part of the circuit at any time. The main spring, as well as the contact spring, is of best spring German silver and serves as the hook-restoring spring. When the receiver hook is down the tension on the restoring spring is practically evenly divided from where it enters the block to where it is fastened at the bottom of the hook, a length of nearly 5 inches. When the hook is pulled down the point of the main spring is



INTERNATIONAL SELF-CONTAINED SWITCH HOOK.

moved down and backward, making a long sliding contact on the bottom spring and leaving a large break between the top springs. With the peculiar arrangement of the main spring as the hook restorer, it will be seen that no part slides and scrapes when the hook is moved up and down excepting at the contact points. All contacts are provided with platinum. The contact springs extend through the insulated block, the ends forming terminals for the wires. The switch is compact and self-contained, and can be readily attached to practically any make of wall telephones. It is said that the new features contained are fully protected by letters patent allowed to the International company.

CHICAGO PAY STATIONS.

For so simple a piece of mechanism there is claimed to be a remarkable number of patentable features in the Chicago Pay Station, the patent office having granted fifty-six

CHICAGO PAY STATION.

separate claims. Some of the unique features of this machine are the muffler on five-cent signals, which saves about five seconds' time on each call; a combination lock on cash drawer, which is said to be impossible to pick; rejector pocket, which returns money deposited in wrong slot; case

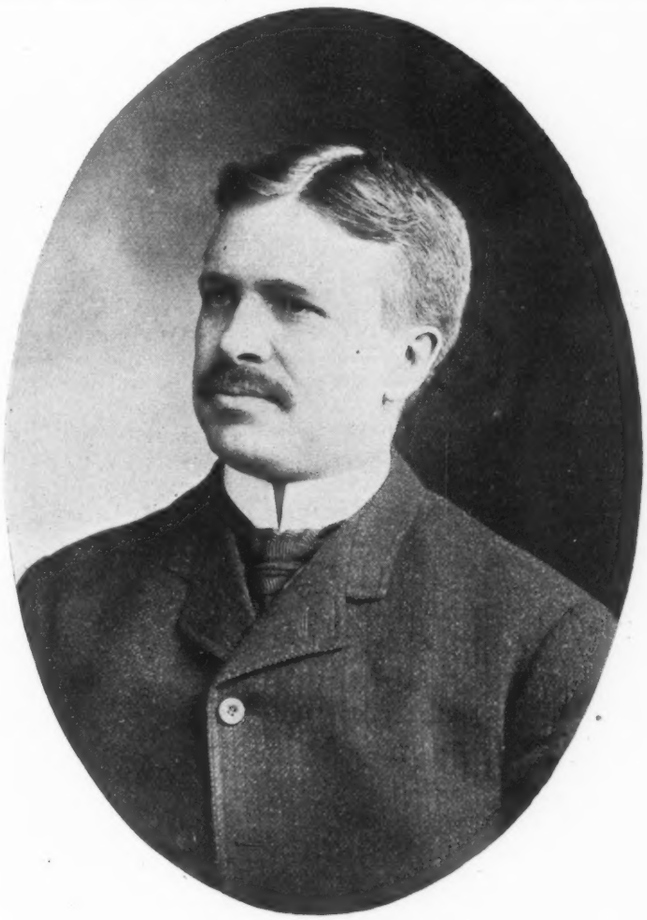
cast in one piece with cash drawer fitted flush, so it cannot be pried open. The small number of parts and the careful manner in which everything is made and fitted is claimed to reduce maintenance to a minimum. A three-slot machine weighs but eight pounds, boxed singly. A case of one dozen weighs ninty-four pounds.

The use of pay stations is becoming an essential feature of the telephone business. If a free public telephone system is in use, not only is the telephone company deprived of a just revenue for public service, but private parties are dissuaded from subscribing for telephones, while they can use the telephone in a nearby drug store without charge.

Exchange managers will serve the financial interests of their companies well by giving the question of public pay stations careful attention and by adopting them.

THE FISK-NEWHALL TELEPHONE MANUFACTURING COMPANY.

A recent entry into the telephone manufacturing field is the Fisk-Newhall Telephone Manufacturing Company of Chicago. The company will make a complete line of telephones, including new features in central energy equipment. The motto of the company will be: "Not how cheap, but how good," and the catalogue soon to be issued is said to



HENRY M. FISK.

contain a number of novelties of great merit. The company will make many innovations in its apparatus, and begins its business under the most auspicious circumstances.

Mr. Henry M. Fisk, president of the Fisk-Newhall Telephone Manufacturing Company, is widely known in the Independent telephone field, having been connected prominently with various telephone manufacturers. He has a wide and varied knowledge of telephony, and brings to the new company the results of a practical training and many years' experience.

Simeon F. Newhall, who will have charge of the accounting and credit department of the Fisk-Newhall company, is a Chicago business man of ability and energy. He has had a broad and general training in commercial life in several large companies, and is well fitted to assume the duties of his new position. He is a conservative and well-balanced business man, and will be invaluable to the new company.

Mr. Franklin Newhall, father of Mr. Simeon F. Newhall, is the financier of the Fisk-Newhall company. He is

SIMEON F. NEWHALL.

well and widely known as one of the largest wholesale fruit dealers of Chicago, in which business he has accumulated a considerable fortune. He is an enthusiastic believer in the possibilities of the new company, and will share largely in the work of making it a success.

A CORRECTION.

A number of reports have been in circulation to the effect that Mr. Frank B. Cook had identified himself with the Home Telephone Company of Los Angeles, Cal., and that he would make the Pacific coast his permanent residence. While it is true Mr. Cook is financially interested in a number of Los Angeles enterprises, including the Home Telephone Company, it is not and never has been his intention to live on the coast. On the contrary, he will in all probability make his home in Chicago, and be actively engaged in business here. He is at present to continue in the Independent telephone manufacturing business, and his concern will probably be known as the Frank B. Cook Electric Company, with factory and general offices in Chicago, where he will manufacture a line of apparatus under his own patents. Mr. Cook is widely known in the telephone field, having been prominently identified with the Bell company for eighteen years. For the past four years he has been in

the Independent telephone manufacturing field and is a man of high character and marked ability. He has been eminently successful in the various enterprises with which he has been connected.

TRADE NOTES.

THE UNITED STATES CARBON COMPANY, Cleveland, Ohio, states that it has made some improvements in the character of its product and is preparing to increase its plant.

THE ELECTRIC APPLIANCE COMPANY, Chicago, has just issued circulars describing its Eaco visual signal metallic circuit switchboard and its Eaco country or party line switchboards for metallic or grounded circuits.

THE AMERICAN VULCANIZED FIBRE COMPANY, Wilmington, Del., has taken charge of the sales and purchasing departments of the American Hard Fibre Company of Newark, Del., and the Kartavert Manufacturing Company, Wilmington.

THE COUCH & SEELEY COMPANY, Boston, Mass., is manufacturing a new type of intercommunicating telephone, using an automatic button switch and an automatic reset, which may be used in the common return or with metallic circuit battery or magneto call.

THE STANDARD UNDERGROUND CABLE COMPANY has removed its Boston offices to the Converse Building, 101 Milk street, where it now has more commodious and more centrally located quarters. Mr. W. B. Sausman is manager of the New England sales department.

THE L. B. ALLEN COMPANY, INCORPORATED, 1335 Columbia avenue, Chicago, has recently completed an addition of three floors to its factory. This company manufactures the Allen compounds, among which are the "Allen Soldering Sticks," "Allen Flux" and "Allen Salts."

THE CENTRAL ELECTRIC COMPANY, Chicago, is distributing among its customers attractive pamphlets, descriptive of the Wurts and Garton lightning arresters. Those interested can obtain this printed matter upon request, from the above company, who will be pleased to quote prices.

THE CHASE-SHAWMUT COMPANY, Boston, announce a greatly increased demand for the Boston Cable Clip, which it manufactures. These clips are now adopted as standard by some of the largest telephone systems in the country on account of their strength, simple application and adjustability to any size cable.

MESSRS. W. R. OSTRANDER & COMPANY, New York, have just issued the thirteenth edition of their catalogue of speaking tube hardware, electric light material, telephone and telegraph instruments, electric bells and batteries and general electrical supplies. The catalogue has 296 pages and is profusely illustrated.

THE CLARK AUTOMATIC TELEPHONE SWITCHBOARD COMPANY, Providence, R. I., has recently closed contracts with the Maine Insane Hospital, at Augusta, Maine, for sixty stations and with the De Beers Explosive Works, Somerset, West Cape Colony, South Africa, for forty-eight stations telephone systems.

THE VARLEY DUPLEX MAGNET COMPANY, Phillipsdale, R. I., is sending out to the trade its 1902 catalogue containing a lot of new matter on the subject of electro-magnets. Some recent and valuable improvements in core-making machinery have made it possible for the Varley company to put up its windings in a complete form. The catalogue is for the cores and washers, thereby giving the magnets a wider field. The catalogue is complete in every detail and a very large variety of telephone magnets is shown, together with instructions for computing the cost of any magnet containing a lot of variable factors. Catalogue also contains useful bare and insulated wire tables, taken from "The Electromagnet" by Wolcott, Kennelly and Varley, and is mailed free on application to any part of the world.

THE STERLING ELECTRIC COMPANY, Lafayette, Indiana, has just issued a very complete and comprehensive catalogue of its protective devices. This catalogue will be sent free to any part of the world if TELEPHONY is mentioned, and it will well repay anyone interested in the protection of telephone apparatus to write for this catalogue.

THE AMERICAN INSULATED WIRE AND CABLE COMPANY, Chicago, Ill., has bought under order of the court the machinery and stock of the Illinois Insulated Wire Company, which was recently placed in the hands of a receiver. The American company is enlarging its factory at 241 South Jefferson street, and will rapidly increase its force of operatives.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, in its new line of telephone apparatus now being placed on the market, is using a new switchboard key, which is said to have several advantages and to be especially adapted for large multiple and trunking boards where the proper number of keys on a small key shelf is desirable.

THE CHICAGO TELEPHONE SUPPLY COMPANY, Chicago, has removed its switchboard, generator, transmitter, receiver and winding departments to an adjacent building in order to secure more room. The present factory of the company is taxed to its utmost and the company has in contemplation the building of a new factory to properly care for its continually increasing business.

THE FARR TELEPHONE & CONSTRUCTION SUPPLY COMPANY, Chicago, Ill., occupies a fine new building at 118 and 120 West Jackson boulevard. A neat circular containing a half-tone illustration of the building, a biographical sketch of Mr. Charles W. Farr and a portrait, reprinted from TELEPHONY, and an invitation to its patrons to make use of its information department, is being sent out.

THE CLARK AUTOMATIC TELEPHONE SWITCHBOARD COMPANY, Providence, R. I., has just issued a 16-page pamphlet containing copies of many testimonial letters received by it from all over the country, and one from France. All the writers of these letters speak in praiseworthy terms about the apparatus of this company. A list at the back of the pamphlet shows that the Clark automatic system is used in England, South France, Amsterdam, Holland, Honolulu, etc.

THE LIBERTY ELECTRICAL SUPPLY COMPANY is the name of a new concern recently started at 136 Liberty street, New York, to handle a full line of electrical supplies and act as manufacturers' agent for provincial houses. The new company is being managed by Mr. B. Rosenberg, for ten years with the Manhattan Electrical Supply Company of New York, and Mr. J. H. Newman, well and favorably known in business circles. The company is starting out with a complete line of supplies, and states that it is prepared to fill all orders promptly.

THE KELLOGG SWITCHBOARD & SUPPLY COMPANY closed contract this week, through its Eastern district office, in Philadelphia, Pa., to furnish and install Kellogg switchboard apparatus for the Keystone Telephone Company in its Third District exchange building in West Philadelphia. The Kellogg company was previously awarded contracts for switchboard apparatus for the First and Second district exchanges for the Keystone company;

the First District is in operation and the Second is being installed. Contracts have also recently been closed through the same agency for full exchange equipments, including the latest improved central energy multiple switchboards and telephones for Independent exchanges in Troy, N. Y.; Lansingburg, N. Y., and Ballston, N. Y., aggregating an ultimate capacity of about 5,000 lines.

THE C. H. WORCESTER COMPANY, Marinette, Wis., has compiled a complete telegraph code suitable for the requirements of buyers and sellers of white cedar products, and published the same in a pamphlet of 16 pages. The Northwestern Cedarmen's Association standard specifications of white cedar products are also included, together with other valuable information on the subject. The C. H. Worcester Company is producer and wholesaler of Michigan white cedar telegraph poles, railway ties, etc., and has twelve branch yards in Michigan and Wisconsin.

THE WYCKOFF PIPE & CREOSOTING COMPANY, manufacturer of conduits and cross-arms, has bought a large tract of ground at Norfolk, Va., where, with excellent shipping facilities both by rail and water, prompt attention may be given to the company's expanding business, which has entirely outgrown the facilities at Williamsport, Pa., and Moving Point, Va. The company is well known by all the leading telephone and telegraph companies, and has been supplying the same since the date of establishment of the conduit branch of the business in 1885.

THE ACME ELECTRIC COMPANY, Chicago, reports a heavy demand for its exchange and toll line switchboards, bridging and series telephones and generators. The company has been compelled to again increase its manufacturing facilities and is running its factory overtime to keep up with the orders for Acme apparatus. The company will put on the market in a very short time a new switch hook and a new transmitter, which are claimed to possess many points of merit. The Acme "Bulletin of Pointers" is now ready for distribution and will be sent free upon request.

THE INTERNATIONAL SPECIALTY COMPANY, New York and Atlanta, has issued a new book, entitled "Telephones that Talk." The book contains eighty-six illustrations and treats of telephones in general. Some of the captions are: "Things Worth Knowing About the Telephone," "Common Mistakes," "Suggestions for Building Telephone Lines," "How to Use a Telephone," "Some Telephone Don'ts," "Some Telephone Troubles," etc. The regular price of the book is fifty cents, but the company will send it free up to May 15, provided this publication is mentioned. Write for it.

THE WESTERN ELECTRICAL SUPPLY COMPANY of St. Louis reports that it is anticipating an extremely heavy demand for supplies and construction material in spring work. It has laid in one of the heaviest stocks on record. It is prepared to furnish promptly from St. Louis stock a complete line of wires and cables, cross-arms, cross-arm braces, insulators, construction tools of every description, overhead material for electric railways, and, in fact, everything pertaining to outside electrical construction. It is also carrying a very large stock of rubber-covered wires and cables, conduit and fittings, outlet and switchboxes and kindred material. The company states the outlook for a large increase in electrical construction of every description for the coming year is the best ever known. It issues a very complete line of catalogues, etc., which will be mailed on application.

THE HAZARD MANUFACTURING COMPANY, Wilkesbarre, Pa., supplied some of its rubber covered wire for the telephone system on the Pan-American grounds. The following report on its work will be noted with interest: "The Independent telephone system which was operated on the Exposition grounds was installed by the Stromberg-Carlson Company. This system, together with the fire alarm system, worked perfectly and the telephone system in particular deserves particular mention. The network of wires run for telephone service paralleled in the same water-soaked wooden ducts heavy current conductors carrying alternating current, potential anywhere between 104 and 1800. The service given was excellent and such could not have been true if these wires and insulation had not been of good material and workmanship."

THE IROQUOIS MACHINE COMPANY, New York, has just been incorporated, having been organized by Mr. W. W. Gibbs, who is also vice-president of the Kidder Press Company and a member of the Gibbs-Brower Company of New York City. The officers are: Edwin A. Smith, president, who is a prominent banker in Providence, R. I.; W. W. Gibbs, vice-president and general manager, New York; Henry C. Babcock, secretary and treasurer, Providence, R. I. Principal office, 150 Nassau street, New York. The company will manufacture new and improved wire-drawing machinery, which they claim will materially reduce the cost of producing wire. They will also manufacture a full line of automatic and plain drop hammers, swaging machines, rolling mills, roller bearings and grinding machines. Having ample capital, they have purchased the plant and business of the Universal Machine Company, located at Providence, and rented a large additional building adjacent to the same. The purchase of this running plant and the addition named will insure to their customers prompt filling of their orders. We understand they will erect a new factory building during the coming summer.

THE KELLOGG SWITCHBOARD & SUPPLY COMPANY, Chicago, report having recently closed a contract with the Rawson Electric Company for Albany, N. Y., for one of its latest central energy multiple switchboards consisting of six sections, with an ultimate capacity of 6,000 lines. Its present equipment will consist of 2,100 lines. Included in this contract is one toll board consisting of one two position section, also all necessary power apparatus, arrester and distributing frames and relay racks, etc.

Anther contract has been closed with this company for one of the company's latest type central energy multiple switchboards consisting of three sections with an ultimate capacity of 4,800 lines. Its present equipment will consist of 960 lines. Included in the contract is necessary power apparatus, arrester and distributing frames and relay racks, also a two position section toll board.

The company also reports having closed a contract with the Rawson Electric Company for Cohoes, N. Y., for one of its latest central energy multiple switchboards of 2,400 lines capacity. Its present capacity will consist of 800 lines. Included in this contract are a toll board, all necessary power apparatus, distributing frames, relay rack, arrester frames, etc., all of which will be furnished by the Kellogg company.

NEW PRODUCTS.

A new product which has recently been placed on the market by the Kellogg Switchboard & Supply Company of Chicago is rosin solder. The company has for some time manufactured this material for its own use, it being used exclusively for all its telephone and switchboard work. The relative advantages of rosin solder for telephone purposes are at once apparent, there being no acid whatever used in its manufacture, or any other material that would tend to corrode soldered connections. It is much cleaner, more convenient, takes up small space, and is wound on spools, the same as wire, and therefore can be had in any quantities. The company at the present time has a capacity of 500 pounds daily. The finished product has the appearance of flattened wire, being about one-eighth of an inch in width. This new product, no doubt, will meet with much success and be fully appreciated by users of this class of material. The company will be glad to quote prices in quantities to suit the purchaser.

THE ILLINOIS ELECTRIC COMPANY.

The Illinois Electric Company, Chicago, cut of whose building and interior views of which are shown in the following illustrations, commenced business in 1898, occupying 45,000 square feet of floor space. This had to be increased owing to the marked success of the company, and at the present time the floor space occupied is nearly one-half million square feet.

The officers of the company are: Frank E. Healy, president; Lemuel K. Cushing, secretary, and Carl Keith, treasurer—men of wide experience in the electrical field, who are naturally familiar with the requirements of the trade, and by close personal supervision of every department of their business, assisted by corps of trained assistants, have succeeded in building one of the largest businesses of the kind in the country.

It has always been the policy of the company to protect the trade, and to this fact is attributed a large share of their phenomenal growth. The business is conducted on modern methods, with the aim to furnish a superior grade of material at a fair price.

The company does business all over the United States and in foreign countries, but its principal trade is in the West. It makes a specialty of exchange and toll switchboards, bridging and series telephones, and telephone and electrical supplies. The company manufactures its own cross-arms, pins and brackets and carries a large stock in Chicago and at the factory. The heads of departments of the company are: N. G. Harvey, general sales manager; H. L. Kirberg, cashier; E. A. Quarfot, chief clerk; F. Clark, shipping clerk. The names of the traveling salesmen and territory covered are: M. McNeill, Jr., Iowa; C. W. Bacon, Wisconsin and Minnesota; D. Newman, Illinois; C. J. Litscher, Michigan and Indiana; Benj. K. Howard, Nebraska, North and South Dakota; C. B. Hall, Pacific coast.

The Illinois Company does a considerable export business, principally in the continental and South American markets, and has recently made large shipments of apparatus and supplies to Cuba and Porto Rica to be used in the construction of telephone systems covering a considerable sections of the islands.

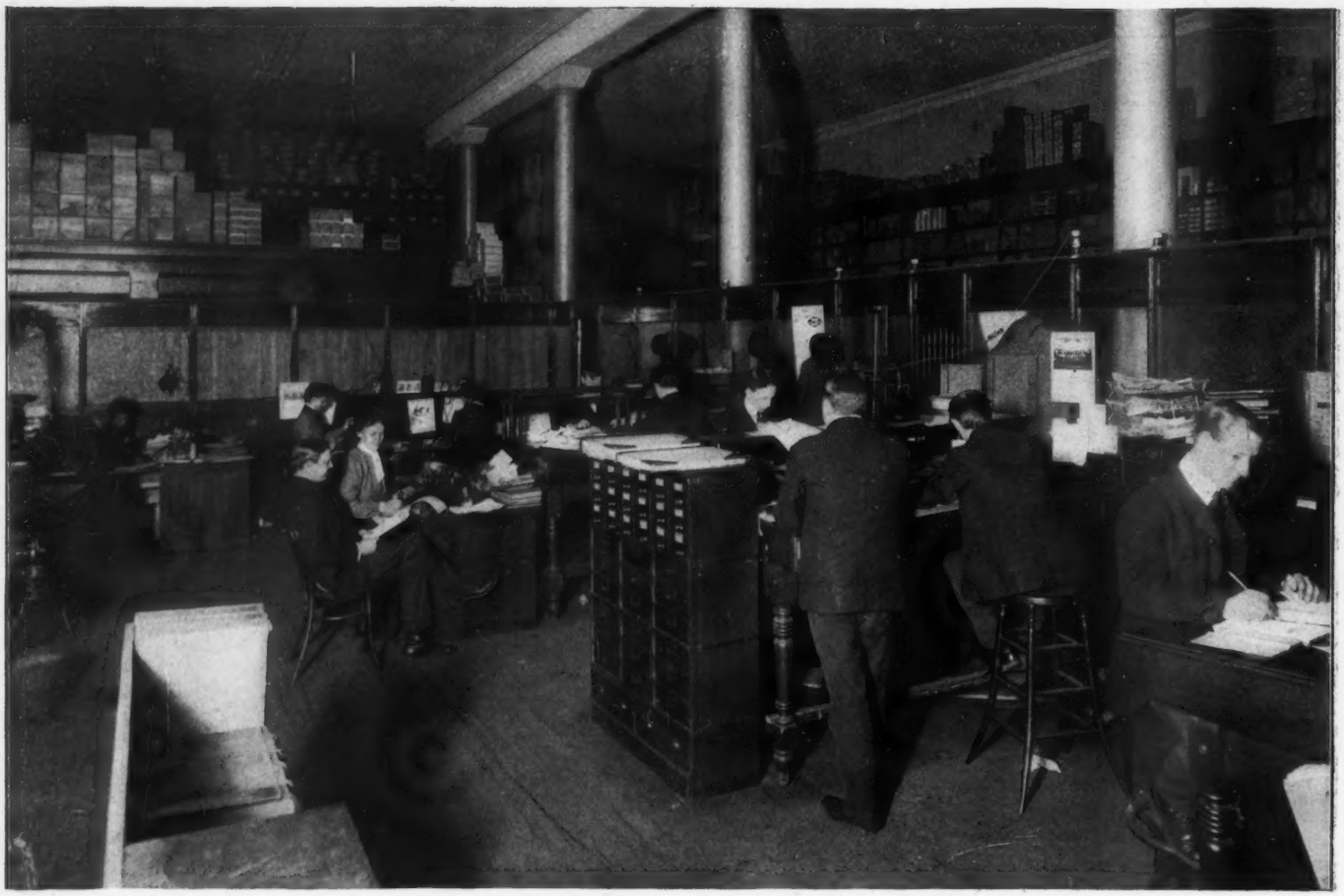
On account of the large quantities in which the company purchases its supplies it is in position to furnish the best material at the lowest prices.

BUILDING, ILLINOIS ELECTRIC COMPANY, CHICAGO.

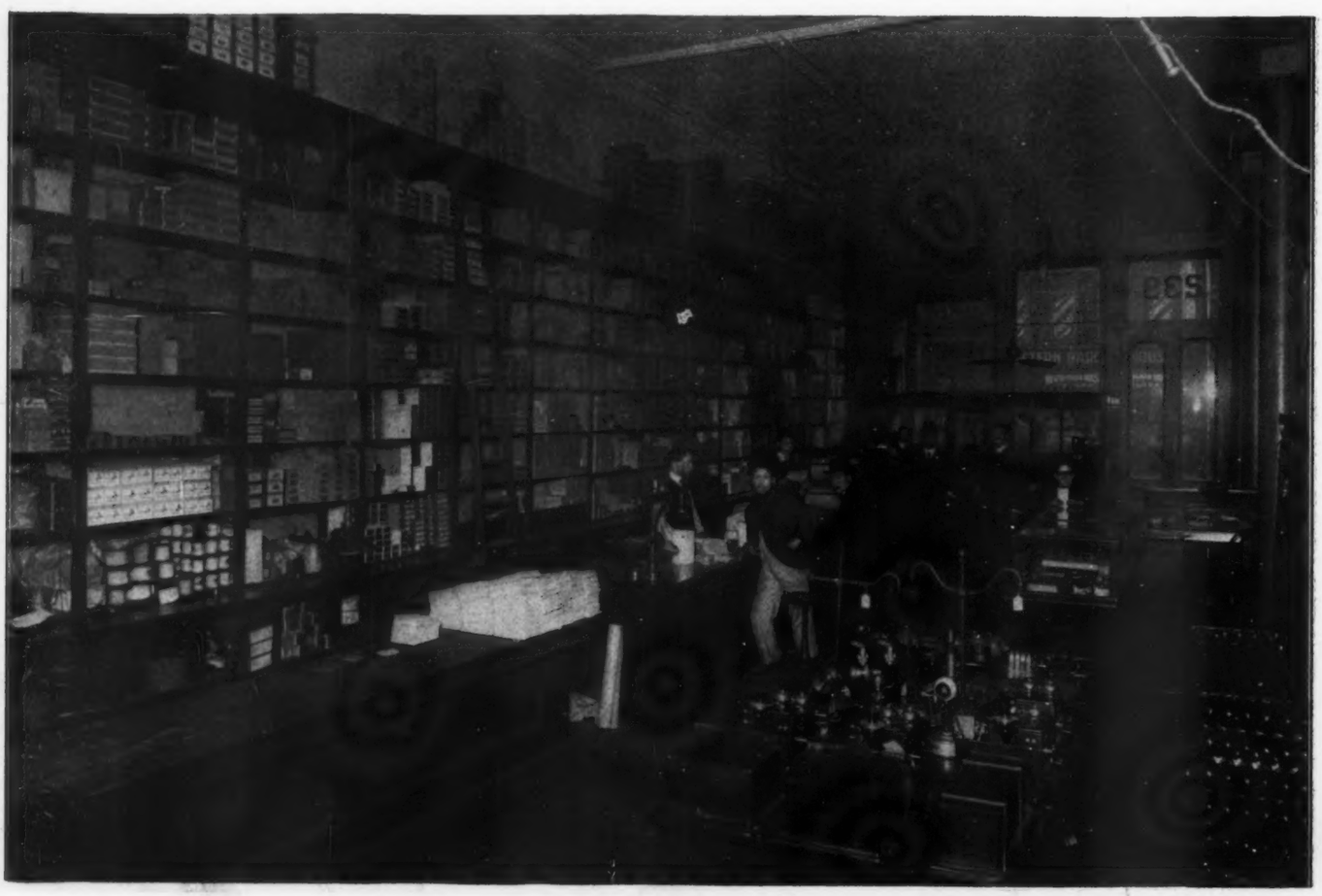
PRESIDENT'S OFFICE, ILLINOIS ELECTRIC COMPANY, CHICAGO.

SECRETARY'S OFFICE, ILLINOIS ELECTRIC COMPANY, CHICAGO.

TREASURER'S OFFICE, ILLINOIS ELECTRIC COMPANY, CHICAGO.

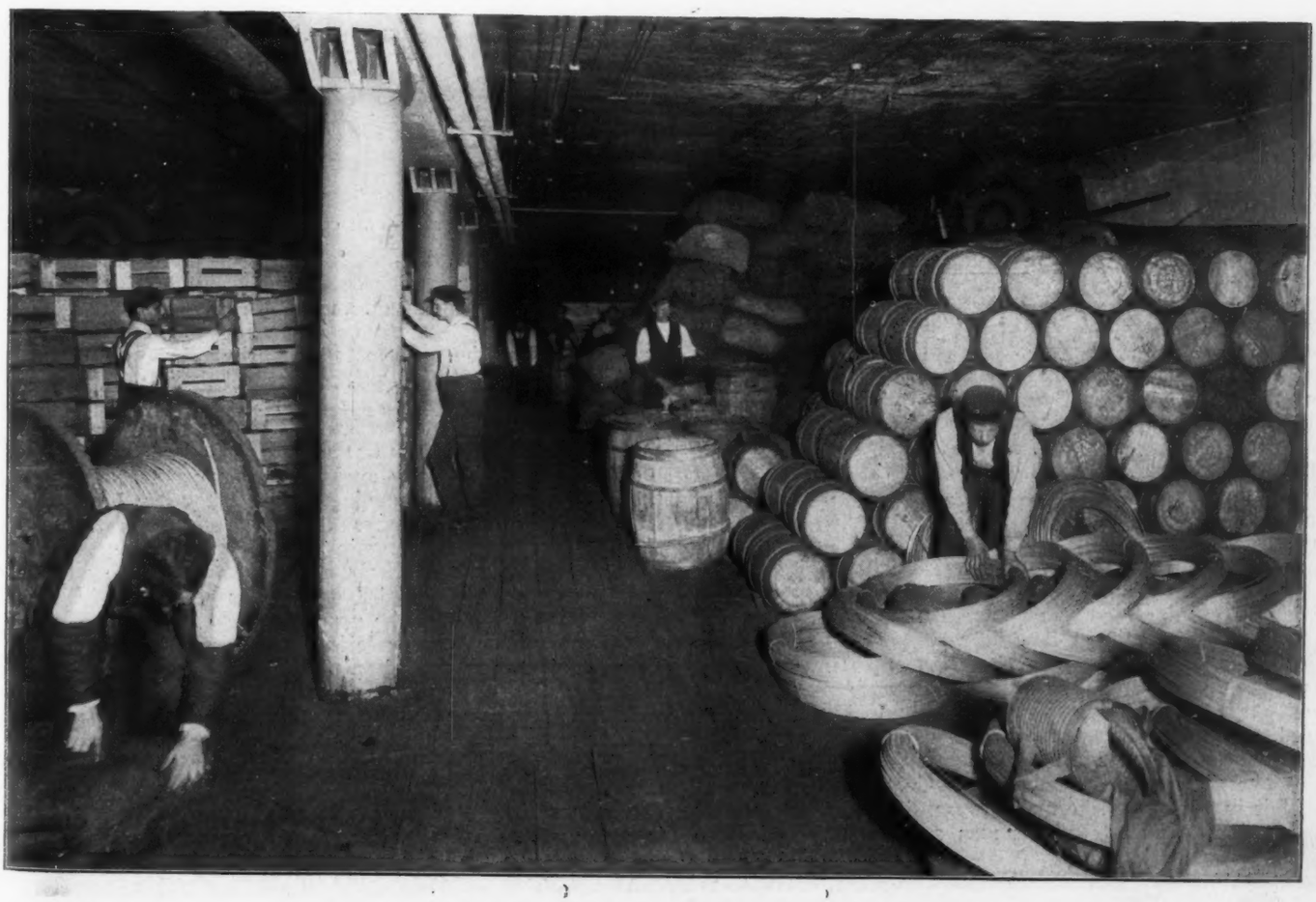


GENERAL OFFICES, ILLINOIS ELECTRIC COMPANY, CHICAGO.



GENERAL SALESROOM, ILLINOIS ELECTRIC COMPANY, CHICAGO.

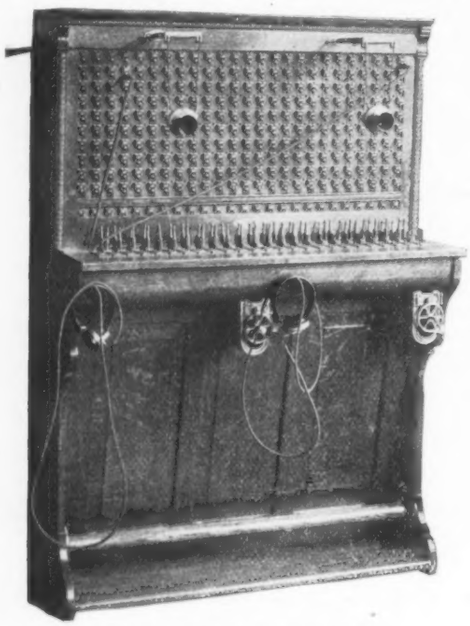
SALES AND STOCK ROOM, ILLINOIS ELECTRIC COMPANY, CHICAGO.



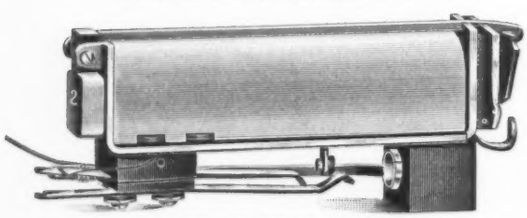
WAREHOUSE, ILLINOIS ELECTRIC COMPANY, CHICAGO.

THE CHICAGO EXPRESS SWITCHBOARD.

The Chicago Express Switchboard is especially designed for use by exchanges of 500 subscribers or less. In such exchanges it is not an economical or desirable proposition to install central energy, on account of the expense of installing and maintaining the necessary power plant. The manufacturers claim for the Chicago Express that it combines symmetry and strength, beauty and durability, finish and efficiency, rapidity of operation, compactness, accessibility of parts, that it may be depended upon under the severest strain of legitimate service, and is covered by the guarantee of a thoroughly reliable factory. Each drop and jack is self-contained and can be instantly removed from board without interfering with any other drop and jack. The frame and drop shell are made of annealed Norway



CHICAGO EXPRESS SWITCHBOARD.



CHICAGO EXPRESS SWITCHBOARD DROP.

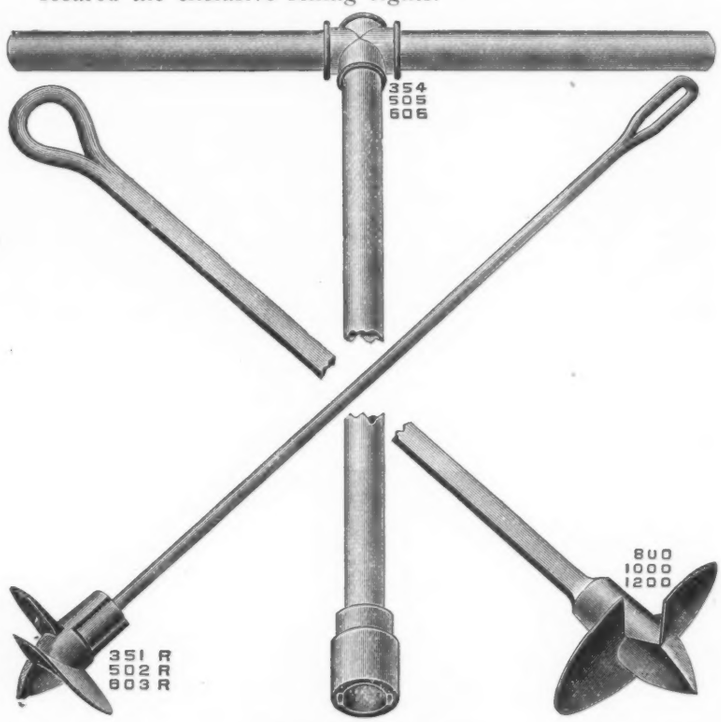
iron and completely envelop the drop coil. This positively prevents cross talk, it is claimed. The jack parts are mounted on hard rubber, as are all other contacts throughout the board. The drop restorer is a nickel-plated slide, so situated that one end is engaged by the plug tip and moved backward. This movement causes the other end to engage the drop shutter and restore it to normal position. The drop restorer at no time has anything to do with the electrical circuit and is purely mechanical in its operation. The operator's key is simple and efficient. It is self-contained and may be removed from the board without interfering with any other part. There are three positions: One for listening and one for ringing out on either cord. The simplicity of this key will especially recommend it to experienced telephone men who have had experience with the complicated operator's keys furnished with many boards which are otherwise up-to-date. Only eight springs are used, while many keys of other boards employ as high as twenty separate springs to accomplish the same purpose.

The Chicago Telephone Supply Company will have an exhibit in parlor C, Sherman House, during the Interstate convention, and all telephone men are cordially invited to inspect the Chicago apparatus on exhibition and to visit the factory at 133-135-137-139-141 South Clinton street and see how high-grade telephone apparatus is produced in large quantities.

HISTORY OF THE STOMBAUGH GUY ANCHOR.

The Stombaugh guy anchor, although patented in 1893 by a man whose name it bears, was not placed on the market until 1900.

John Stombaugh conceived the idea of making an anchor for fence posts that could be bored into the ground without digging and the consequent filling and tamping. In the fall of 1899 a few circulars were issued, with crude illustrations, showing how the device could be used in connection with fence work. One of these fell into the hands of W. N. Matthews & Bro., who at once recognized the merits of the device in connection with electrical pole guying, and secured the exclusive selling rights.



STOMBAUGH GUY ANCHOR.

In March, 1900, the total sales amounted to 75 anchors; but having perfect confidence in the utility of the device they kept hammering away, and month by month the sales have shown a handsome increase, until the enterprise and push which have been given to the business brought orders in the month of March, 1902, for several thousand anchors of all sizes. These figures are given to show that discriminating users of material only need to be told of a good thing to get them to adopt its use.

The Stombaugh guy anchors are so constructed that there are absolutely no moving parts. They can be bored into the ground in from three to twenty minutes, and once set will hold so great a strain that it is almost impossible to dislodge them. In nearly every instance where a test has been made it is found that the rods will break before the anchors pull out of the ground.

These anchors are made in six different sizes, varying from 3½ inches to 12 inches. The 3½-inch anchor is only intended to be used on light work, as it only has a 5-16 inch rod. For ordinary pole guying the 5-inch anchor is standard. For corner strains or heavy poles the 6-inch anchor should be used. The cross-sections of the rods in the above sizes are not sufficiently great to stand the twisting strain necessary to bore the anchors into the ground; therefore it is necessary to have a hollow wrench, which slips over the

rod and keys to the anchor head, to use in connection with installing them. For very heavy strains, or dead ending, the 8, 10 and 12 inch anchors should be used, the size depending on the conditions of the ground and the amount of strain to be placed on the anchorage. These sizes have rods from 1⅛ to 1½ inches square, and can be bored into the ground by placing a lever through the eye and the assistance of a chain wrench or "S" wrench. The two styles of anchors and wrenches are shown in the accompanying cuts.

There is probably no device on the market which has been as carefully tested as to its merits as the Stombaugh guy anchor. The distributing agents had a number of very exacting tests made by Professor R. C. Carpenter of Cornell University, and from which Professor Carpenter compiled an extremely useful formula for determining the strain which a given sized anchor will hold at a stated depth.

It has been demonstrated that a 5-inch Stombaugh guy anchor, when placed 5 feet in the ground, will hold 12,500 pounds' strain before pulling out, more than the breaking strain of ⅜-inch strand. This test was made in sandy soil, consequently it would be considerably more in clay.

The cost of a 5-inch anchor and rod is 69 cents; to this add freight, construction and other expense, and your entire anchorage will not cost more than 75 cents, or, at the very outside, 90 cents.

There is one point which seems to have been overlooked by a great many people using these anchors; that is, that the anchor should always be bored into the ground in the same direction that the guy wire runs. If they are put in at other angles it allows the rod to bend toward the pole and the guy wire becomes slack. It is believed that this device will become so popular in the near future that it will be known in every construction gang. One of the points of success in introducing this article has been the manufacturers' willingness to ship any quantity to a prospective user, on 30 days' trial, payment conditioned on cordial approval, or the goods to be returned at the shipper's expense and forward charges refunded.

THE CLARK AUTOMATIC TELEPHONE SWITCHBOARD CO.

This company, whose offices have lately been removed to No. 15 Custom House street, Providence, R. I., was organized in June, 1900. Its present officers are E. L. Freeman, president; J. W. Phillips, vice-president; Moses E.

BATTERY CALL WALL TELEPHONE WITH CLARK DIAL ATTACHED.

NO. 7 DESK TELEPHONE WITH CLARK DIAL.

INTERIOR OF SALES AND EXHIBITION ROOM, 15 CUSTOM HOUSE STREET.

Torrey, treasurer; Alfred S. Clarke, secretary, and J. L. Putnam, manager.

Among the directors of the company are the following business men: Hon. E. L. Freeman, Walter S. Ballou, Albert E. Farwell, Alfred S. Clarke, Moses E. Torrey, J. W. Phillips, J. H. Preston, George H. Smith, E. M. Prindle, F. A. Seib, W. H. Herrick, Judge A. Van Wagenen.

The company has placed upon the market an automatic intercommunicating telephone system especially designed for mills, factories, warehouses, docks, public buildings, small towns, plantation work, etc., this apparatus being extremely simple in construction, durable, efficient and economical in its operation. The system has been thoroughly tested out by actual use for the last three years or more.

This past summer the Clark company received the highest award for automatic switchboards and appliances at the Buffalo exposition. The accompanying cuts illustrate the apparatus, also showing the sales and exhibition room where a model plant is in operation and the merits of which the public is invited to investigate.

The appended names are among those who are using the Clark Automatic Telephone System at the present time: Stanley Electric Manufacturing Company, Pittsfield, Mass., the Union Wadding Company, Pawtucket, R. I., the Commercial National Bank, Providence, R. I., Trenton Iron Company, Trenton, N. J., Walther-Robertson Drug Company, Pittsburg, Pa., the F. S. Webster Company, Boston, Mass., Semet-Solvay Company, Ensley, Ala., L. C. Page & Co., Boston, Mass., the National Steel Company, New Castle, Pa.

In foreign countries the following: British Thomson-Houston Company, Rugby, England, Cape Government Railway Service, Cape Town, South Africa, Santa Marta Railway, Colombia, South America, Messrs. Geveke & Co., Amsterdam, Holland, Societe Alsacienne de Constructions Mecaniques, Mulhouse, Haute-Alsaca.

The company has just filled orders for Hawaii through its Honolulu agent, Mr. Guy Owens, for five installations, including the Honolulu Iron Works, the Oahu Railway and Land Company, Hackfield & Co.'s office building, Honolulu, and one plantation system, in which service will be given over varying distances up to five miles.

ANALYTICAL TESTING OF TELEPHONE MATERIAL.

Mr. H. M. Deavitt, chemist, 394-396 Wabash avenue, Chicago, is doing the analytical work for the leading Independent telephone manufacturers of the country, and has the following to say of that branch of the telephone business which he has made a specialty of for several years past:

Is it not time to know absolutely what is in the material you are using, and then see that it is the best adapted for the purpose? It does not necessarily mean, because the highest price is paid for certain material, that it will do the work best. On the other hand, the article for which the lowest price was paid may be the most expensive in the long run.

There is a mixture of certain waxes costing less than the pure beeswax which gives a greater insulating capacity than the pure wax. In primary battery use, for satisfactory service, almost a chemically pure sal-ammoniac is necessary. How many telephone houses know about the purity of their sal-ammoniac? A salesman shows the purchasing agent samples of various brands, which, to the outward appearance, are alike, each being white and crystalline. He thinks he is saving money for the firm by buying from the sample, which is a quarter of a cent cheaper per pound, but instead of buying sal-ammoniac he is apt to find he also has in his possession a little salt, or sulphate of soda, or alum, as the case may be. After the consumer has used this mixture in his battery for a short time, he writes to the man who sold him his batteries to take them away, that they are not as good as the former shipment. Would it not have been better to know in the first place what he is sending out, and thus avoid disappointing a customer?

The magnet steel in the magneto box is another product which has a most important bearing upon the efficiency of the telephone. The quality of the magnet steel is dependent upon the amount of the five metalloids found in all iron and steel—namely, carbon, silicon, phosphorus, sulphur and manganese. It is the presence of these metalloids in steel which gives to it all its properties, either good or bad.

Inasmuch as no two heat have exactly the same percentage of these elements, it is necessary to establish, by means of tests and experiments, the amount of each metalloid which steel should contain to give a magnet steel of maximum strength. This has been carefully worked out, so that it is possible to tell from the result of a careful chemical analysis what its magnetic strength would be. It is possible to make poor magnets from good magnet steel with improper tempering, but it is impossible to make good magnets from poor steel.

The following will illustrate the importance of the magnet steel question: A concern may be fortunate enough to get satisfactory magnet steel for a year or more, and thereby get a reputation for sending out good generators, but if a poor lot of steel is made up and the generators sent over the country, complaints from the various points come in, the work of years is undone, and your competitor, who has his steel analyzed, steps in, and because he takes no chances on the quality of his raw material gives no opportunity for the recovery of the lost ground.

The same can be said of the use of Norway iron in the telephone.

Does the telephone manufacturer know what is contained in the insulating material he is using? Is the silk or cotton which he is putting on his wires adapted for his use in quality and price? Is the paraffine wax he buys the grade which best fills his wants? Is the hard rubber filled with lime or other mineral loading? I ask these questions, as so little can be told of the contents of material by its outside appearance.

Having been for several years chemist with the Western Electric Company, and not only carefully analyzing the raw materials, but also closely observing each step in the manufacture, has placed me in a position to be able to tell, after I have accurate analysis, whether it will do the work required or not.

A DOUBLE DIAPHRAGM TRANSMITTER.

A distinct novelty in the field is the Knowles-Tillman double diaphragm transmitter, tests of which have recently been made with what are said to be satisfactory results.

The transmitter possesses two distinct diaphragms, the result of using which is said to be a large increase in power and intensity. It is claimed by the inventors that this transmitter will be superior in many ways to single diaphragm transmitters and will afford perfect articulation.

The construction of the transmitter is claimed to be such as to protect the diaphragms from external injury, and gives permanent and accurate adjustment of all parts. Mechanically it is strong, and all parts are made of selected stock. A number of experiments have been made with the Knowles-Tillman transmitter in actual use, reports of which have from time to time appeared in the daily press and have aroused considerable interest in telephone circles. Among other advantages claimed for this transmitter is good results in use at noisy places, such as in machine shops and factories.

A company has been formed to manufacture this transmitter, and advance orders so far received are an evidence of the market for it. The Illinois Central Railroad Company have, it is said, adopted the Knowles-Tillman transmitter for use on the company lines.

The transmitter will be manufactured in Buffalo, N. Y., by the Knowles-Tillman Company.

EACO APPARATUS.

The telephone department of the Electric Appliance Company, Chicago, realizing that by the construction of the many rural or farmers' telephone lines, a demand would be created for a good reliable switchboard for connecting these lines together, has designed a switchboard to meet this demand and is now ready to furnish its Eaco country or party line switchboard.

In designing this switchboard the idea in mind at all times was that where there are a number of party lines terminating in a central office, and which use a code of signals or rings to call the different subscribers of stations, that it becomes impossible to furnish satisfactory service with a regular type switchboard.

The Eaco party line switchboard is equipped with high-resistance bells, which are provided with indicators, the object being to distinguish the number of rings by the bells and which line has called by the indicator which would be

20 NUMBER EACO PARTY LINE SWITCHBOARD.

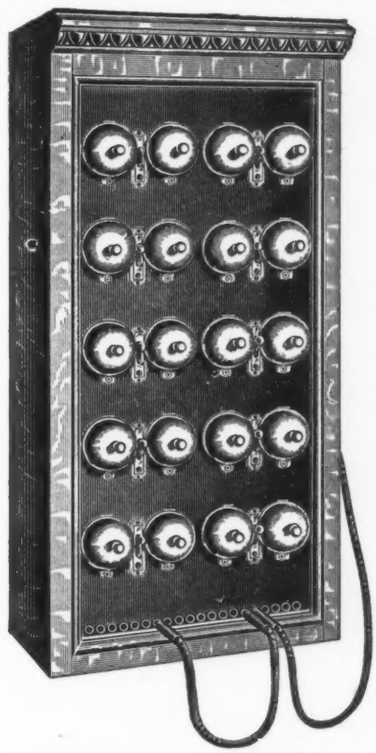
down. If the switchboard was not wanted the operator would simply restore the Indicator and it would not be necessary to plug in on the line. It is necessary to obtain good service to have the bells on the switchboard wound to the same resistance as those on the telephone on the line to which it is to be connected. The Eaco country or party line switchboards are made in two styles of cabinets, one to stand on the floor, and the other to fasten to the wall. The floor cabinet is furnished with the regular operators' set, consisting of head receiver, transmitter and powerful hand generator, and is also equipped with their regular ringing and listening keys. The wall type cabinets are furnished with duplicate jacks for each line, one operator's plug and one or more pairs of connecting plugs and cords, as may be desired, the idea being to use a regular wall telephone or a desk telephone in place of the operator's set.

THE TELEPHONE IN THE FUTURE.

The telephone has been so far developed, and systems of circuits and exchanges have grown to so great a size as to furnish reasonably accurate data for at least a rough guess at the probable future of telephone extension.

It cannot be denied to-day that the telephone has long since ceased to be a luxury and has become a very vital necessity to business affairs, says the Electrical Review. By various improvements in its design and construction, the first cost of telephone apparatus has been greatly reduced and has now reached what may be regarded as its limit; that is, it will probably never be possible to make telephones much, if any, more cheaply than they are made to-day. Improvements in exchange service and lines have probably brought the cost of switchboards, conduits and cables down to a very reasonable figure, and in this direction there does not appear to be much hope for improvement in cost. The consequence is that exchange service, as it is sold to-day, will not likely be very much cheapened in the future.

This is certainly true, so long as the manual system of operation is adhered to. The automatic telephone exchange system has accomplished remarkable and highly satisfactory results in small exchanges. What it would do in a larger exchange, or in the largest central office, is a question which can probably be determined only by experiment. It is in the



10 NUMBER EACO TOLL LINE SWITCHBOARD.

way of being tried in Chicago, where a company has already laid many miles of tunnels under the principal streets to receive the conductors of a telephone system of great magnitude, which is to be operated entirely on the automatic system. Certainly no one with the future of telephony at heart could wish to see this experiment fail.

While the telephone is eventually destined to become much more widely used than it is now, its use will most likely extend, not through any great cheapening of rates, but rather through the greater understanding of its necessity. Doubtless, also, the message rate or meter system will be widely extended, this being a most equitable basis of payment for telephone service, and also giving the benefit of low rates to those who make only occasional use of the telephone. It is not looking too far ahead to assume that in such centers of population as New York systems of over one hundred thousand telephones will soon be in operation. It is well known to telephone people, but hardly yet appreciated by the general public, that the cost of conducting an exchange business is by no means reduced with the increase of the number of subscribers; on the contrary, it is very materially increased. Probably the old law of wholesale and retail fails nowhere

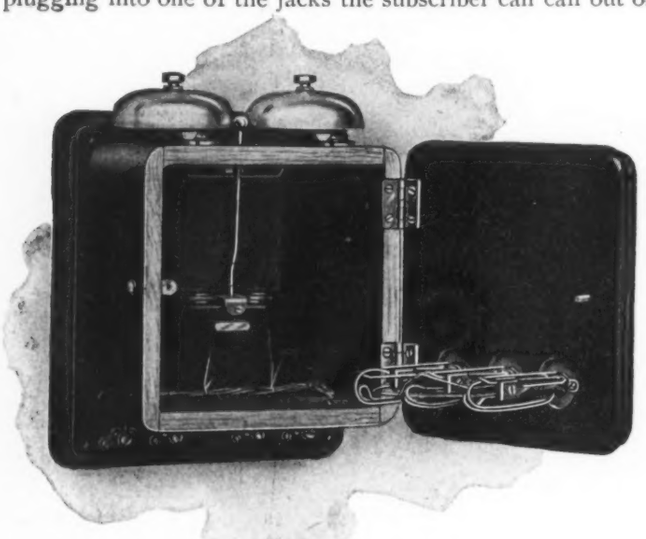
else so conspicuously as it does in telephone exchange operation. For this reason it is hardly reasonable to look for any material decrease in the cost of service with the growth in size of exchanges, but from other considerations a very wide extent of telephone use eventually may be safely predicted.

KELLOGG "CUT-IN STATION."

The accompanying illustrations show an open and closed view of a "cut-in" station recently placed on the market by the Kellogg Switchboard & Supply Company. It is adapted for use where parties wish to establish connections

KELLOGG "CUT IN STATION" CLOSED.

between lines running in opposite directions. The station is equipped with a ringer with very long cores and wound to 1,600 ohms resistance, three individual jacks and a standard switchboard cord and plug. The switchboard cord is fastened to the binding posts of the subscriber's set and by simply plugging into one of the jacks the subscriber can call out on

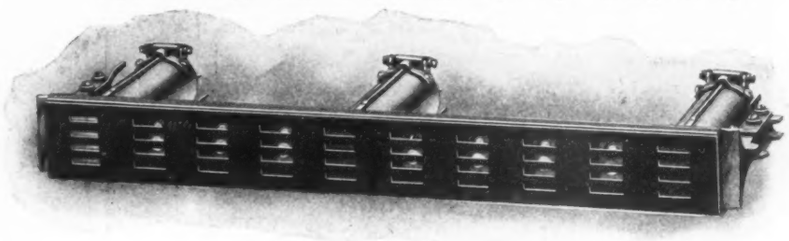


KELLOGG "CUT IN STATION" OPEN.

either line. The middle jack being wired up in multiple, it is preferable to leave the plug in this jack after conversation has ended on any line, for in case the party receives a call he can at once determine who it is from without the necessity of plugging into first one line and then the other. After ascertaining on which line the party is, the subscriber will plug into the corresponding jack, thus making the conversation private. The subscriber is always able to receive a call, even though he leaves the plug out entirely.

NEW APPARATUS.

In the accompanying illustration is shown a mechanical signal recently placed on the market by the Kellogg Switchboard & Supply Company of Chicago. The signal is known as the mechanical type and has been designed to meet the requirements of small central energy switchboards, where a less expensive outfit is desired than the incandescent lamp signal. The signal has been carefully worked out by competent engineers, and is of good mechanical design and construction, and is said to embody all the necessary and important features of a lamp signal. Each winding consists of a single soil, enclosed in a drawn steel shell, which, it is claimed, eliminates all cross talk. The shutter is so arranged that a small movement of same will show a white signal through slots in the mounting strip, having the ap-



KELLOGG MECHANICAL SIGNAL.

pearance of a gridiron. The shutter shown in the left of the illustration is in the position of a call. Each signal is provided with a set of platinum contacts for night-alarm or pilot circuits. They mount on not less than one-inch centers.

EACO PORTABLE LINEMAN'S TEST SET.

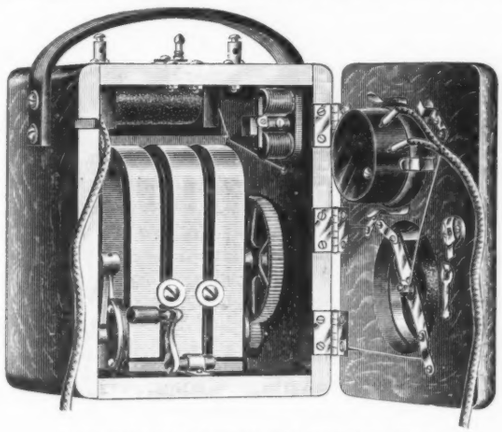
This is a complete long-distance instrument, manufactured by the Electric Appliance Company, Chicago. It is equipped with a powerful three-magnet generator, double-pole receiver, the Eaco Bell type solid back transmitter, induction coil buzzer and two cells of dry battery.

In designing this instrument the company's engineering department took into consideration that to be of any practical value, weight and size were two important factors. The weight complete is 11½ pounds, and it measures 6x6½x

EACO PORTABLE LINEMAN'S TEST SET CLOSED.

7½ inches. The generator is equipped so that it furnishes a direct pulsating current or the regular alternating current. The object being that where a lineman in testing may not desire to call the subscriber, the switch on top of the box is moved over to the point marked "D." The generator then, on being turned, will give a direct current, which will not ring polarized bell on the subscriber's telephone, but will throw the drop or indicator on the switchboard. The receiver is cut in in series with the buzzer, so that it is not absolutely necessary to depend on the buzzer alone for receiving a signal. In testing, a receiver is much

more sensitive than any ringer movement. This instrument is what would be commonly called a series instrument, but a special coil of high resistance wire is provided, so that in listening for a test ring, on bridging or party lines, all the current will not flow through the test set. A switch is provided which, when closed, short-circuits or cuts out this



EACO PORTABLE LINEMAN'S TEST SET OPEN.

resistance. The company claims to have accomplished this result in this instrument, which will answer for both series or bridging work, and which is practical, durable, compact and light in weight. Each instrument is provided with a heavy leather carrying strap.

By referring to the cuts a good idea of the general make-up and compactness may be obtained.

STANDARD TELEPHONE AND ELECTRIC COMPANY.

The "Standard" has recently been mailing a large number of attractive bulletins to customers and telephone buyers, illustrating the different kinds of apparatus manufactured by the company.

It is also perfecting and testing a new ringing and listening key and its new self-restoring switchboard drop, which are expected to be ready to place upon the market during the next month.

Owing to the large increase in orders the "Standard" has found it necessary to install new machinery with which to turn out apparatus in larger quantities, in order to meet the demand promptly and keep pace with new business.

ONE YEAR'S EXPERIENCE WITH A CHECKING BUREAU IN IOWA.*

The questions brought out by a year's work with a system of checking toll items between companies have been so manifold and of such pertinence that I may well say that success has been measured not so much by actual results secured in adjusting the balances and omissions of the transactions as in pointing out the obstacles to be surmounted, the methods to follow and the opinions to first be harmonized before the work can be a part of our success. I say success, because success will come to us or our work whether or no it is our expectation. I do not refer to the financial success of any individual, but to the fact that I can see ten years ahead, when telephone service will be a matter of method so definite and exact that the detail will be surprising to us and we will take pride that even every 15-cent transaction will be a matter of systematic record so complete and so in the line with good business, that not only will a disputed item be a rare thing, but every detail will be verified and proven before anyone will have the opportunity to ask for an accounting.

This gives you the idea of the obstacles which have been encountered in this year's work. We have succeeded in getting reports together. These have been compared and therefrom have been extracted statements of omissions and losses. These have, in some cases, been rectified, and in addition thereto balances between companies have been secured. But there has existed an unsurmountable obstacle in the work, which consists of two elements—one, differences of opinions as to method, and next, failure to stand by agreed methods. I shall, therefore, suggest as a basis of my recommendations, first, that we must define our agreements and then bind ourselves in a substantial way to the definition.

This opens up the questions of rates primarily. The next thing which stands out prominently is that new element of competitive rights. With these two solved and some guarantee from those interested which will enforce a penalty such as railroad companies are compelled to assume and render themselves liable for, there is a prospect of great benefits from the proposed work.

As to the matter of rates which have preëminently been a matter of controversy before this association I am forced to one conclusion, that while we all know it will be best to have a harmonious tariff sheet, it is also a truth which no one can change that each company can and will set its own price, and the only way to change this power is to see the elimination of the weaker by the growth of the stronger. Therefore, while it is allowed by the stronger that the weaker exist as a matter of strength to the cause, some method of checking must be agreed upon which will let great or small charge little or much over his own lines, "in his own house," as it were. Here I see the solution of the one great problem of how to adjust charges to and from connecting lines, by saying to each company: "Set your price, and I will pay it; or, make your price right or I will not use your lines." Herein is safety and assurance. If we connect with a good set of lines, or even the Bell lines, we will ask, first, last and all the time: "What will it cost?" And when we allow them—yea, even the Bell company might connect with us on these terms—when we allow them to connect with us we have a right to compel them to ask: "What will it cost?" Of course, if all charge alike, it will be better in all ways, but when one company desires service over another's, it is needful to say what is the expense. This is business, and there is no one who can deny its propriety.

Competitive rights are, you will notice, the opposite of territorial rights. Territorial rights have no existence. No one may, in right or in wrong, claim any people as his own. Each has a privilege to invest his money where the individual judgment dictates, and this must never be interfered with. Years ago, before this august assembly, I heard a contention that someone had overstepped the boundary of his real estate. It is a fact that one really does not get much time to dabble in the latter if he is in the telephone business. But it is true that none should pretend at this day and age of the new business of the telephone that he can stand in the way of the building of any line or series of lines. He may make them unprofitable by cutting rates before the other fellow has a start sufficient to live on, but he can never control territory. When a line 24 miles long, between two county seats, can be built to give a good talk for $25 a mile of fence wire and 14-foot posts most of the way, with a total investment of $600, who can stop the competition? And if it should happen that the builder has aspirations only to control this line with salaries proportionate to the $600 investment, then who cannot say that the same line can charge a rate of half the admitted safe tariff and in these cases make a profit? And if he can make a profit he is not a trespasser upon territorial rights nor is he infringing competitive rights. A business man is never out of place save when he fails to make a legitimate profit. And when he does not make this, it is not our place to so plead to him or to the people, but herein comes opportunity to exercise the height of our business skill, and while it may seem best to attempt to overthrow the investment of

*Paper read before the Iowa Telephone Association, Des Moines, March 11, by Dr. C. F. Bennett.

the loser, we should here insead admit his existence, harmonize our work with his, use our lines to do that which he does not assume, and allow the opportunity to come which will enable the one to succeed in proportion to his effort, and the other likewise. I feel that danger ahead lies too much in individual instances of neglecting too much the building well of our own structures in our desires to prevent the success of those already destined to be a part of ours, because of their being of smaller parts. Therefore, the question of competition which will apparently stand in the way of harmony in the carrying out of the checking bureau idea should be overlooked and give everyone the full privilege to have and to hold.

To insist that every man pay his debts is the only feature which should support the checking bureau. To insist that any should have rights outside of this is interfering with personal equality, which is a sure sign of disintegration wherever seen.

Therefore I have learned by this one year's work that we should agree to make every effort to require the just payment of debts, and when this is done, the desired results will have been attained. First make the patron pay, then the connecting line. Do not worry about the fellow you do not know, 'way beyond. Settle with the one you do business with only. The other fellow will have to do the same. Along this line we have prepared a sheet, more or less complete, which need only be signed by duly authorized persons, and each one who signs will thereby have first done his share to begin a checking bureau which will make and keep all friends. Yes, if one is not a friend of Independent—I do not like the word "Independent"—telephone interests, he can in this way be made a friend, and I know of no friend so true as one who has to be. Even those would be enemies of ours who say they will never be seen in the company of corporations, and build up the man of straw, known as "mutual" service, or those who claim to worship their telephone deity by giving the public telephone service at less than cost, by throwing their time in as nothing and their money to suffer the consequences of the moth and rust, are not our enemies, but are the enemies of themselves and the Bell company, and are, in fact, our greatest benefit, if we only pursue that course of making use of the loss at the proper times.

In accordance with the foregoing, I have prepared and now submit to you a form of agreement, simple, to be signed by all, which will open up the possibility of a satisfactory checking bureau and enable the same to continue as a part of our work as necessary as the primary accounting department itself and as easily understood. I wish to say that the motive of the checking work is by no means easy of comprehension, and should in all cases be submitted to the business ends of your companies instead of some hired mechanic whose technical ability cannot serve the place of an accountant's judgment.

I submit below a copy of the sheets referred to, for your correction and for your approval, if possible. It may be that they are suitable to our needs:

CONNECTING TOLL LINE CONTRACT.

....., Iowa, ..., 190..

The following shall be the agreed method of settling balances between ..... of ..... and ..... of ....., for connecting line service at ....., and shall constitute a contract from and after ....., 190.., for a period of ..... and thereafter, till written notice for its discontinuance is given by either of the principals hereto to the other herein named, at the above given address:

The receiving line shall be paid its price, as per schedule below, by the connecting line, for delivering messages from said lines, which messages shall include all those originating at points on or beyond said connecting line and terminating on receiving line.

The above method may be carried out in either of the following ways:

1. The respective companies shall severally and jointly submit duplicate sheets of their message reports on or before the 20th of the month, for the month previous to ....., who shall be granted full power to make balances as per the above, and which shall be settled by check or current exchange within three days from its receipt by either party. And it is agreed that the balance of the aforesaid ..... shall be an admitted indebtedness, collectable in any justice court in which the amount does not exceed $300. To the above may be added as penalty for delinquency 10 per cent for every ten days or fraction thereof.

2. If original sheets are not submitted by the 20th of the month the receiving line shall render a bill to connecting line company for the delivery of all messages coming from points on or beyond said connecting company's lines, plus messenger fees paid out, all of which claims shall be paid within three days from receipt without reference to any counter bill.

A failure to make bill prior to the last day of the month for the business of the previous month shall operate as forfeit of any claims for service as a receiving company. It is also agreed that any item of the said bill which shall, on comparison with original sheets, be determined to be an error, shall be charged back to the claimant and the amount deducted from the bill submitted. Original sheets will in all cases be conclusive. A failure to remit promptly with errors corrected shall entail a penalty of 10 per cent for each ten days or fraction thereof.

It is agreed that the exchange at ..... shall receive a commission of 15 per cent on outgoing business and 10 per cent on incoming business, with no charge for frank or monthly switching or through switching save by special agreement.

Schedule for toll rates of the.....
.....
Schedule for toll rates of the.....

Signed. .....
For the .....
.....
For the .....
.....

I hereby certify that I have signed the above, acting under the authority of the board of directors of the ...., at a .....meeting of that board, held in the ..... of ....., on the ..... day of ....., 190..

.....

Subscribed and sworn to before me, a notary public in and for ..... County, Iowa, this ..... day of of..... 190..

.....
Notary Public.

I hereby certify that I have signed the above, acting under the authority of the board of directors of the ...., at a .....meeting of that board, held in the ..... of ....., on the ..... day of ....., 190..

.....

Subscribed and sworn to before me, a notary public in and for ..... County, Iowa, this ..... day of ....., 190....

.....
Notary Public.
....., Iowa, ..., 190..

EXCHANGE COMMISSION CONTRACT.

..... hereby agree to render switching service and line connection kept in repair to city limits at the ..... exchange for the ....., on the following basis:

Fifteen per cent on collections for outgoing messages and 10 per cent on amounts collected for the message at

originating point on incoming messages. If line is provided and kept in repair by the ..... there shall be charged 10 per cent only on out and 10 per cent on incoming business. No charge shall be made for frank, monthly or through switching, save by special agreement.

This contract to continue for a period of ....., and thereafter till written notice is given by either party for its discontinuance.

Signed. .....

For the .....

I hereby certify that I have signed the above, acting under the authority of the board of directors of the ...., at a .....meeting of that board, held in the ..... of ....., on the ..... day of ....., 190...

.....

Subscribed and sworn to before me, a notary public in and for ..... County, Iowa, this ..... day of ....., 190....

.....

Notary Public.

(N. B.—The question of how to charge commission on frank, monthly rate and through business is hard to determine. Railroads haul empty cars to point of starting free. I have thought these might be handled free, and have accordingly made the commission a little high, so this would be granted.)

....., Iowa, ..., 190..

TOLL STATION COMMISSION CONTRACT.

..... hereby agree to render toll station service at ..... for ..... at ..... toll station, ..., Iowa, for .... per cent on outgoing business and .... per cent on incoming business for a period of ..... and thereafter, till written notice is given for its discontinuance.

Signed. .....

EXCHANGE SWITCHING TELEPHONE PROPOSED.

(For country stations not at commercial points.)

..... agree to provide and keep in good repair at city limits of ....., Iowa, a telephone line connection for service at ..... switchboard in ..... exchange, and render incoming and outgoing switching service at the said exchange solely for members of the household at country stations placed not less than ..... miles, nor more than ..... miles, from city limits, for a consideration of..... cents per month per station. Creameries, stock buyers and others who use lines as business men shall pay double rates. The number of stations on said line shall number not less than ..... The line shall not be used for business in competition with undersigned.

Outgoing business from the exchange to farm stations on above line shall be charged for only at the request of the owner of connecting line, of which charges 5 cents per message, or the whole of the monthly fee, which shall not exceed ..... cents per ....., shall be retained by undersigned as commission. This contract shall continue for a period of ..... and thereafter till written notice is given for its discontinuance.

Signed. .....

For the .....

I hereby certify that I have signed the above, acting under the authority of the board of directors of the ...., at a ..... meeting of that board, held in the ..... of ....., on the ..... day of ....., 190...

.....

Subscribed and sworn to before me, a notary public in and for ..... County, this ..... day of ....., 190...

.....

Notary Public.

....., Iowa, ..., 190..

....., the undersigned owner of a line, beginning ..... the ..... of ....., Iowa, accept the above proposal and request you to charge ..... cents per message, or ..... for outgoing business.

Signed. .....

.....

.....

.....

.....

NORTHERN ELECTRICAL CONSTRUCTION COMPANY.

Another large industrial enterprise was recently organized at La Crosse, Wis., under the name of the Northern Electrical Construction Company. The company has a capital stock of $100,000, and will do a general electrical and telephone construction business. It is intended also to finance various new telephone enterprises.

Prominent in the organization of the company have been a number of well-known telephone men, among whom are C. A. Sterling, M. I. Berger, W. D. Burford and G. L. Saunders. The general manager of the company will be Mr. Burford, who, until recently, has been chief of construction of the Wisconsin Telephone Company.

More explicitly stated, the purpose of the company is to finance companies and construct electric light, telephone, street railway and interurban electric railway plants and lines in cities in Wisconsin, Iowa, Minnesota and the Dakotas. In detail the plan is a novel and interesting one. The company will enter a city and finance a company which will build a telephone plant and electric light plant or a street railway line, or all three if desirable. It then proposes to finance a company, or to contract with the company already organized, to build an interurban electric railway to the nearest city of importance which would want similar institutions. The process is to be repeated there, and the result of the company's work will be that every city not already provided will have all modern facilities supplied by electric power and all the cities will be connected by a chain of electric railroads.

The company will incorporate in Minnesota also and possibly later in Iowa and the Dakotas.

REFORM IN TOLL LINE OPERATION AND RATES.*

I feel that I owe you an apology for my lack of formality in coming before you without having prepared a written address, but the fault is not entirely my own, as it was not until the last moment when it was too late to give such a paper the attention it required that I learned of the formality of the meeting. I trust, however, that as I am thoroughly conversant with the two subjects that it is my desire to discuss before you, I shall be able to interest you.

The first and most important of these two subjects is the question of operating. While it is true that the Independent telephone service, not only in Michigan, but throughout the Middle West, is superior to that furnished by our competitors in efficiency if not in extent, at the same time we must not be content to rest on past laurels but must see to it that we keep in the van. Furthermore, aside from our duty to our patrons and the public generally, we must bear in mind that we owe a duty to ourselves. The telephone day covers a period of but five hours, and every minute of the telephone day should be used to produce revenue. Operating service which is efficient for the public but is not economical for us affects our revenue and in time will require unnecessary investment. The first and fore-

*Substance of an extemporaneous address made before the annual convention of the Michigan Independent Telephone Association at Detroit, March 13, By H. H. Robinson.

most of our operating defects is the question of proper phrasing. The operators at many small exchanges and toll stations in answering a call, use the out-of-date "hello" instead of the name of the town. This only makes it necessary for the operator at the calling end to hold up the line awaiting this information before she can give the details of her ticket. In many instances I have found that operators, when putting through their calls, indulge in various remarks which only tend to consume valuable time and should be omitted. Another great fault is the improper method of putting in and passing a call. The form of toll tickets used by Independent companies is practically the same everywhere, and if the exact form of the ticket is followed in putting in a call, the operator who makes the inward ticket is able to take down the information as fast as she can write without asking a question. For instance, if Mr. Brown, of Smith & Brown at telephone No. 174 Saginaw, wants to talk with Mr. Jones at telephone No. 214 Lansing, the receiving operator can take the details without asking a question if the information is given as follows: Saginaw, Brown, of Smith & Brown, No. 174, to Jones, No. 214, Lansing; while, with a slight change in this, the receiving operator will find it necessary to ask sometimes three or four questions before her ticket is complete. Further economy in the use of the toll lines can be effected by the use of a code system between two points at either end of a through circuit. Experience has demonstrated that many large concerns have business with a given person at a given point sometimes three or four times a week and sometimes several times a day. In such cases, by adopting a code system and equipping the toll operator at each end of the line, 85 per cent of the time occupied in putting through a call can be saved. Roughly, this system is as follows: Each toll operator is provided with a small card index, with index cards running from one to fifty which will care for the requirements of a city of 100,000 people. The patrons who are in the habit of holding these frequent conversations are each assigned one or more code numbers and they are advised that when they desire to make a call it will only be necessary to call L. D. and give the operator that number. As soon as the code number is assigned, a number of outward tickets are made up and placed in the card index, these tickets containing all details of the call. A number of inward tickets are placed in the card index at the receiving operator's end of the line containing the same details. When the originating operator receives a request from, say code No. 27, she immediately goes in on the line, rings the point of destination, asks for code No. 27, and at the same time takes from her card index the ticket which has been made out and contains the details of the call. The receiving operator takes from her card index the inward ticket and is immediately in possession of all information necessary for putting the call through, and the actual time consumed on the toll line has not exceeded five seconds. As soon as the receiving operator's party is ready to talk, she calls the originating end and says: "Ready on code No. 27," and the connection is established.

It is unnecessary for me at this time to go into the many minor defects such as the interruption of a busy circuit, ringing on a busy line, proper monitoring of connections, etc., for these faults are all well known and are, in general, remedied as soon as discovered.

Another important detail which will effect an economy in the use of our circuits is the abolishing of the practice of comparing time and adjusting charges through the busy time of the day. Comparing, in some cases, is done daily by the operators after busy hours, and in many other cases, in fact most generally, is done immediately after the connection is over. This latter plan I like the best as being the most satisfactory, providing it is better systematized. As soon as the clearing-out signal is given, both operators will go in on the line and the originating operator advises the terminating operator of the number of minutes and the charge, taking down the circuit as soon as this information has been given. The terminating operator can either O. K. the ticket, if her time checks with that of the originating office, or, by placing the letter "D" or some other identifying mark on the reverse side of the ticket, indicate that that time does not check, and all tickets so marked can be taken up each day or evening by the chief operator when the lines are not busy, and straightened out. By this method time will be saved.

Another great question which comes properly under the head of operating is the enriching of our toll service and the increasing of its efficiency to our patrons. At this time, when competition is strong and there is a fight all along the line, every little detail assists us to get the business. One of the most vexing reports which can be made to the patron after he has put in a call and waited from thirty minutes to an hour for his connection, is the announcement that "We cannot locate your party." Our competitors have from the first followed the practice of notifying their patrons that the party called for is "Gone for the day," if they are unable to locate him in the city or at the telephone number asked for. The dissatisfaction that this little phrase has caused, especially when abbreviated to the code letters "G. D.," is beyond estimate, and to overcome this I have recently established in Cleveland a delayed call position. All tickets which are not put through within fifteen minutes from the time they are received by our operator are turned over to the delayed call operator who immediately proceeds to finish them. If the party called for has left the town at which he was called, we find out his destination and all other data that we can get which will enable us to locate him. If we succeed in locating him, we look up the rate to the point at which he is found and advise the party calling that his party can be reached for that sum. In many instances this practice costs us more than we get out of it, but we feel that the expense and trouble is well repaid by the assistance we render to our patron and in instances too numerous to mention we have secured a steady business from subscribers who, previous to that time, had only used our lines vicariously. This system is particularly valuable in assisting large concerns to locate their traveling salesmen, and the complimentary letters we have received on this account alone would fill a volume. Undoubtedly, one of the weakest points of long-distance telephony to-day is the necessity for a messenger at small towns and post-offices where there is no exchange in operation. It is true that we do not suffer as much from this as do our competitors from the fact that our exchanges are very much more numerous. In order to mitigate this evil as much as possible, I have undertaken, and with fair success, to secure from the various companies a flat rate applying to any point within the corporate limits of a given town or village. Information as to these charges is furnished to our large patrons and our operators are instructed that when calls are made by such patrons the question of messenger service is not to be brought up when the call is put in and the charge is O. K. if necessary. This saves the time of our operators, annoyance to our patrons and loss of revenue in getting in our collection.

I will now call your attention to the question of toll rates, and it is in this branch of the business that we find the greatest lack of uniformity. The Independent companies in the state of Ohio have adopted a standard basis of three-fifths of a cent per mile for three minutes conversation, while the Michigan and Indiana companies bill all the business at one-half of a cent per mile for five minutes conversation, although in the latter states there are many instances where arbitrary rates have been made without any fixed unit as a basis except to keep below the corresponding Bell rate. This latter method is, of course, unbusinesslike and unnecessary. The problem of issuing rates between stations on the lines of the United States Telephone Company in Michigan and stations on the lines of connecting Independent companies is now confronting us.

(Continued.)

Banquet Tendered by the Telephone Manufacturers and Electrical Supply Dealers

the Interstate Independent Telephone Association, Sherman House, April 9, 1902.